TNT25(BN251) Service Manual

Motorcycle Maintenance Manual

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The contents of this Manual are compiled according to the latest product information at the time of compilation. The illustrations and pictures in this Manual are for reference only and may differ from the actual parts.

Abbreviations

A	Ampere	lb	Pound
ABDC	After bottom dead center	m	Meter
AC	Alternating current	min	Minute
ATDC	After top dead center	N	Newton
BBDC	Before bottom dead center	Pa	Pascal
BDC	Bottom dead center	PS	Horsepower
BTDC	Before top dead center	psi	Pound per square inch
℃	Degree celsius	r	Revolution
DC	Direct current	rpm	Revolutions per minute
F	Farad	TDC	Top dead center
℉	Fahrenheit degree	TIR	Total indicator reading
ft	Foot	V	Volt
g	Gram	W	Watt
h	Hour	Ω	Ohm
L	Liter		

Exhaust Emission Control Information

In order to protect our common environment, Zhejiang Qianjiang Motorcycle Co., Ltd. has introduced crankcase blow-by gas filtration system (1) and exhaust emission control system (2) which conform to the applicable regulations of the US Environmental Protection Agency and California Air Resources Board, and equipped the motorcycles sold in California only with fuel vapor recovery system (3) which conform to the applicable regulations of California Air Resources Board.

1. Crankcase blow-by gas filtration system

This system is used to prevent crankcase gas from being discharged to the atmosphere. The crankcase gas is forced into the intake side of the engine after passing oil separator. When the engine is working, the gas is fed into the combustion chamber and then will combust with the fuel and air from the fuel injection system.

2. Exhaust emission control system

This system can reduce the amount of pollutants discharged to the atmosphere in the exhaust generated by this motorcycle. The fuel injection system, ignition system and exhaust system of this motorcycle are carefully designed and assembled to ensure efficient engine operation and low emissions of pollutants.

The exhaust system of this motorcycle includes a catalytic converter system.

3. Fuel vapor recovery system

The fuel vapor in the fuel injection system is not discharged to the atmosphere but is forced into the working engine and will burn out. If the engine is not started, the vapor will be stored in the canister. If it is a fluid fuel, it will be sucked into oil separator, and then return to fuel tank.

Atmospheric Protection Act is a federal law that deals with motor vehicle pollution and includes provisions commonly known as “Modification Regulations of *Air Pollution Control Act*”.

“203(a) No one may do or instigate others to do the following:

(3) (A) Before the final buyer purchases or receives the motorcycle or motorcycle engine, no person shall dismantle or damage any part mounted on the motorcycle or motorcycle engine according to the regulations of the manual; the manufacturer or dealer shall not intentionally remove or damage any part after the sale or delivery of any motorcycle or motorcycle engine to the final purchaser.

(3) (B) After the sale or delivery of any motorcycle or motorcycle engine to the final purchaser, any person who engages in the repair, maintenance, sale, lease or transaction of motorcycle or motorcycle engine or the operation of motorcade shall not remove damage any part mounted on the motorcycle or motorcycle engine…”

Remarks

It is generally accepted that “the removal or damage of any part” has the following meaning:

1. The temporary removal of any part for maintenance or temporary failure to operate the part does not belong to “modification”.
2. The following cases belong to “modification”:
   a. Incorrectly adjust vehicle components, so that the exhaust emissions exceed the emission standards.
   b. Use replacement part or accessory, thus affecting the performance or durability of motorcycle.
   c. Add part or accessory, thus making motorcycle out of the standard.
   d. Permanently remove, disassemble or damage any part of exhaust emission control system.

It is recommended that all dealers comply with the above regulations of federal law and any violators will be subject to civil fines.

Strictly Prohibiting the Modification of Noise Control System

Federal law prohibit anyone from doing or instigating others to do the following: (1) Any person removes any part or make it inoperative before the final buyer purchases or receives any new motorcycle or in the course of the use of motorcycle, unless there is a need to repair, maintain or replace this part; (2) any person continues to use the motorcycle after removing any part of any motorcycle or making it inoperative.

The following acts belong to “modification of motorcycle”:

- Replace the original exhaust system or muffler with parts that do not comply with federal regulations.
- Remove muffler or any of its internal components.
- Remove air filter or its cover.
- Modify muffler or inlet system by means of cutting, drilling or otherwise, to increase noise level.

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Introduction

This Manual is designed for well-trained mechanics in well-equipped shops. And the contents of this Manual are exhaustive and the basic information is complete, so the motorcycle owner can carry out the basic maintenance and repair work with the help of this Manual. In order to maintain or repair the motorcycles smoothly, the operator must have the basic knowledge of the mechanic and understand how to correctly use the maintenance tools and the process of workshop. If the motorcycle owner has insufficient experience or cannot ensure to adjust, maintain and repair the motorcycle properly, he/she must ask a qualified mechanic to carry out the above operations.

In order to carry out the above operations efficiently and avoid serious mistakes, it is necessary to read this Manual, familiarize yourself with the relevant procedures and operate in a clean place before operation. Do not use other temporary substitutes if there are special tools or equipment specified in this Manual. The accuracy of measurement results can be ensured only by using the appropriate tools. In addition, the use of alternative tools will affect the safety of operations.

During the warranty period, it is recommended to carry out repair and maintenance in strict accordance with this Maintenance Manual. If the motorcycle owner fails to perform maintenance or repair in accordance with this Manual, the motorcycle will not covered by the warranty.

In order to extend the service life of your motorcycle as far as possible, please comply with the following points:

- Comply with the *Regular Maintenance Table* in the maintenance manual;
- Carefully observe and pay attention to regular maintenance;
- Use appropriate tools and original Benelli motorcycle parts. This Maintenance Manual has described the specific tools, instruments and test devices required in the maintenance process of Benelli motorcycle. For the original parts used as spare parts, see *List of Parts*.
- Carry out operations in strict accordance with the procedures in this Manual, do not take a shortcut for quickness.
- Remember to keep detailed maintenance and repair records, including date and new parts installed.

How to use this Manual

This Manual describes all systems in chapters according to the main systems of motorcycle. “Quick Guide” can make you know all the systems of the motorcycle at a glance and help you quickly find the corresponding chapters. Each chapter has a comprehensive catalog.

For example, if you want to understand the ignition coil, you can find the chapter of “Electrical System” by using the “Quick Guide” and then find the section in which the “Ignition Coil” is from the Contents in the first page.

If you see the following warning and alert signs, please pay attention to the contents on the signs! Remember safe operation!

⚠Warning
This warning sign is used to remind operation personnel to comply with the specific descriptions or procedures, otherwise the personal injury or death will be caused.

Note
This alert sign is used to remind operation personnel to comply with the specific descriptions or procedures, otherwise the equipment will be damaged or destroyed.

In addition to “Warning” and “Alert”, this Manual also includes another four signs to help you distinguish different information.

Remarks

○ This sign indicates some operation tips which can make operation more convenient and improve the efficiency.

• This sign indicates a certain step or a task to be completed.

○ This sign indicates a certain substep or how to complete the work of this step. This symbol may be also placed in front of a certain “Remark”.

★ This sign indicates the measures taken in accordance with the test or check results in the previous step.

There are exploded views of system parts below the contents of most of the chapters. These illustrations describe the parts that the torque, oil, grease or thread fastening agent needs to be tightened specifically during installation.

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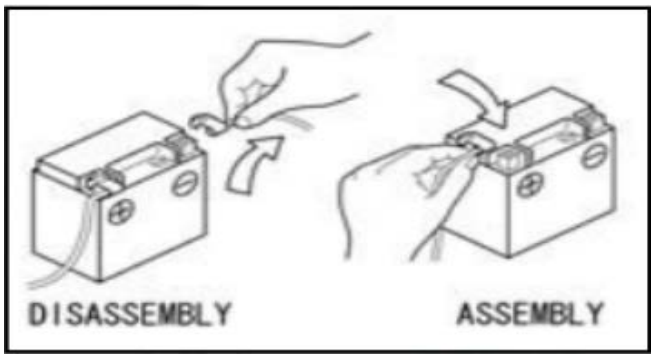
Notes before Maintenance

Please read the following precautions before checking, disassembling or assembling motorcycles. In order to facilitate the actual operation, the chapters are provided with notes, illustrations, pictures, precautions and detailed descriptions. This section describes the special precautions during the removal and reassembly or disassembly and reassembly of common parts.

Pay special attention to the following matters:

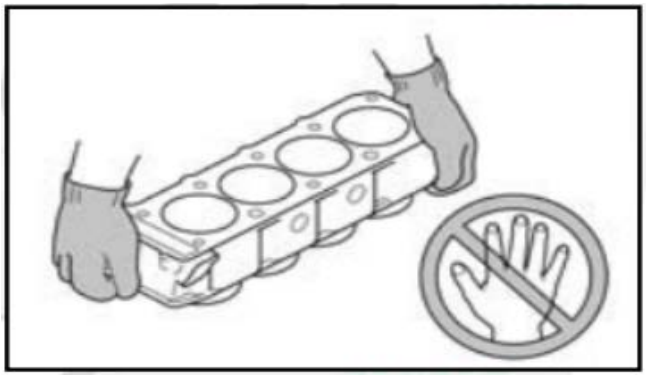
Battery Installation

Before any operation is conducted for the motorcycle, disconnect the battery wire and battery to prevent the engine from starting accidentally. Disconnect the negative wire (-) and then disconnect the positive wire (+). After the operation is completed, connect the positive wire (+) to the positive terminal (+) of the battery and then connect the negative wire (-) to the negative terminal (-).



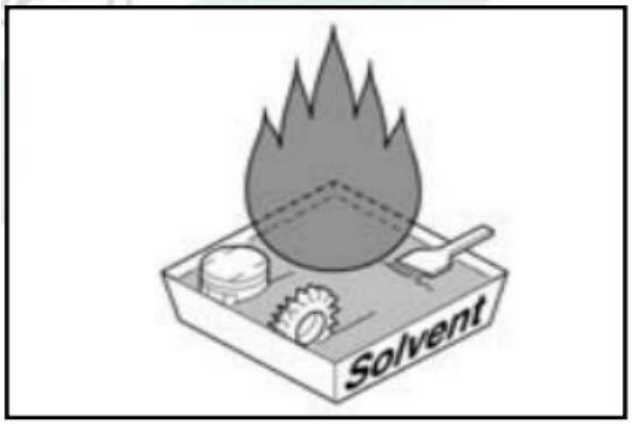
Sharp Edge of Part

To avoid that the hands are scratched by the sharp edges of parts, gloves must be worn when the larger-size or heavier parts are moved.



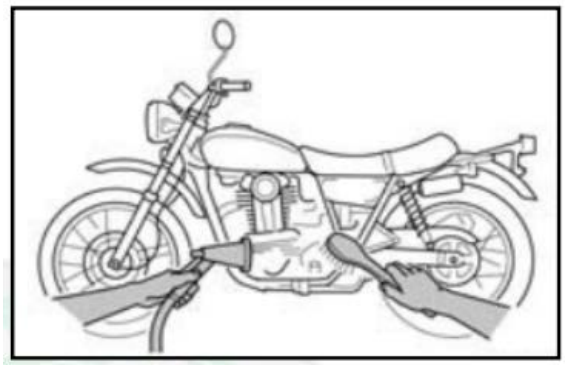
Solvent

The solvent with high flash point shall be used when parts are cleaned. Use the solvent with high flash point according to the instructions provided by the solvent manufacturer.



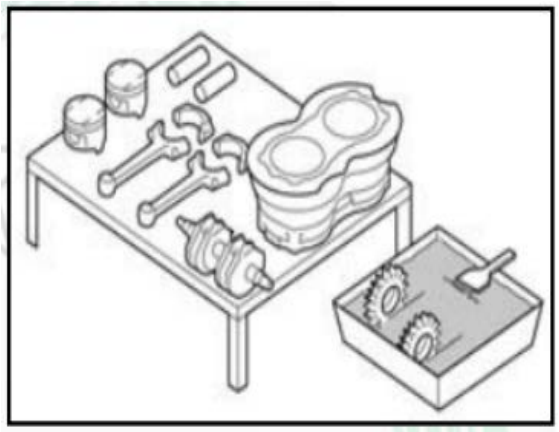
Cleaning Motorcycle before Disassembly

Thoroughly clean the motorcycle before disassembly. If dust or other foreign materials enter the sealing area in the disassembly process, the excessive wear will be caused and the performance of motorcycles will be reduced.



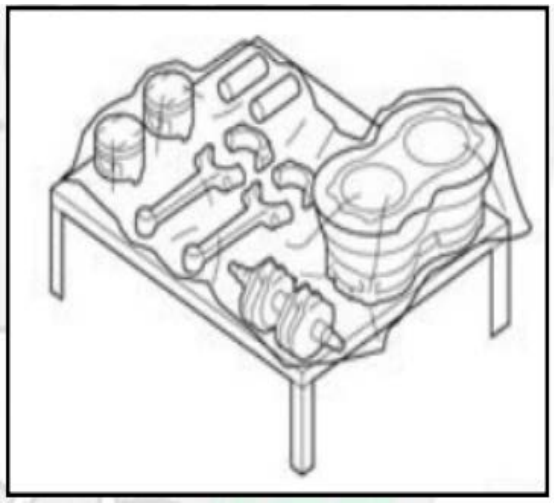
Collecting and Cleaning Removed Part

The removed parts are easily confused. So arrange the removed parts in accordance with the disassembly order and reinstall the parts after they are cleaned.



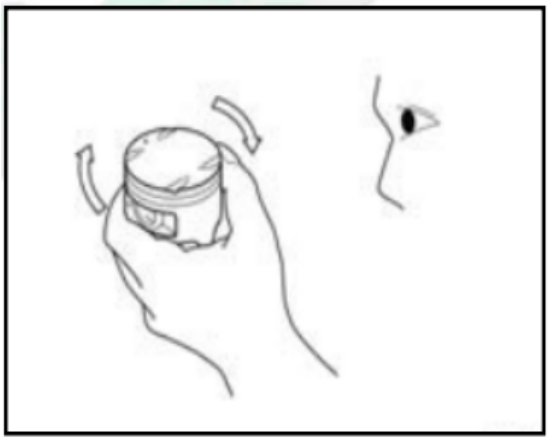
Storing Removed Part

After all parts (including subparts) are cleaned, store the parts in a clean area. Cover the parts with a clean cloth or plastic film to prevent any foreign materials from falling into the parts before reassembly.



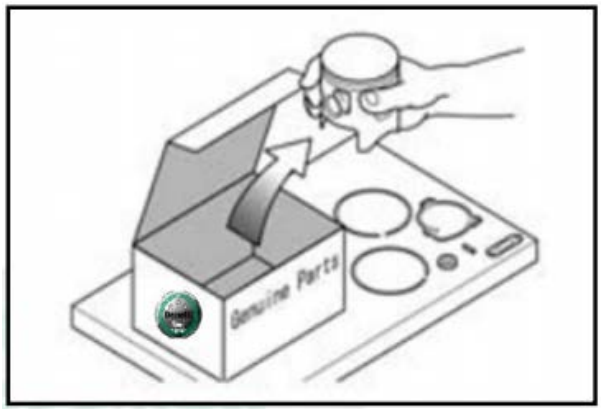
Check

The use of worn or damaged parts can lead to major accidents. Visually check whether the removed parts are corroded, discolored or damaged. The service limits of individual parts are described in the appropriate chapters of this Manual. If any damage is found or the part has exceeded the service limit, the part must be replaced.



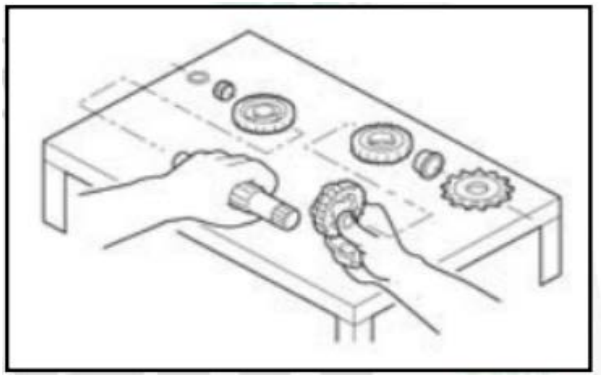
Replacement Part

The replacement part must be an genuine part of Benelli or a part recommended by Benelli. Gaskets, O-ring seals, oil seals, grease seals, circlips or cotter pins and other parts must be replaced with new parts once they are removed.



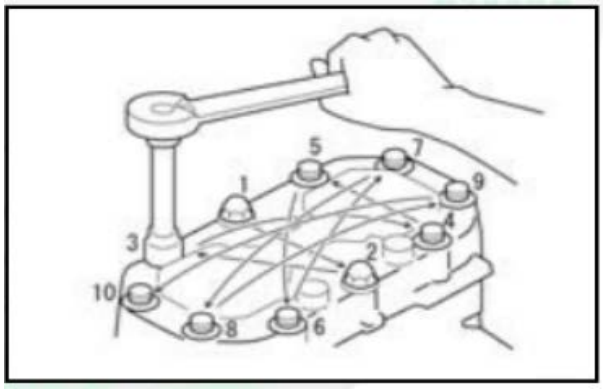
Assembly Order

In most cases, the assembly order is contrary to the disassembly order, but the assembly must be carried out according to the order given if this Maintenance Manual gives the assembly order.



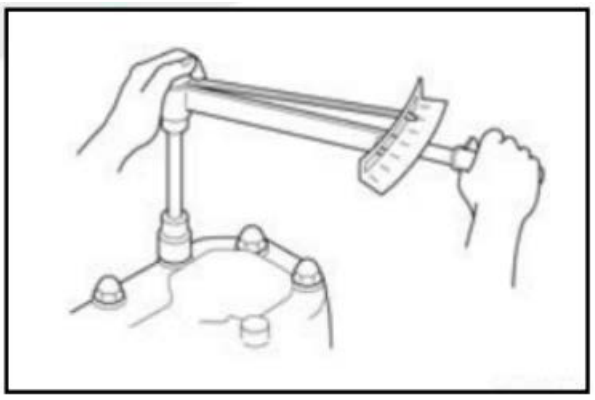
Fastening Order

In general, when a part is fastened with several bolts, nuts or screws, put the bolts,nuts or screws into the corresponding holes, screw them in without applying torque, and then tighten them in the specified order to prevent warping or deformation which can cause faults of parts. Whereas, if the bolts, nuts or screws need to be unscrewed, turn a quarter circle, unscrew them and then continue to loosen them off. If the fastening order is not specified, the fasteners shall be alternately screwed diagonally.



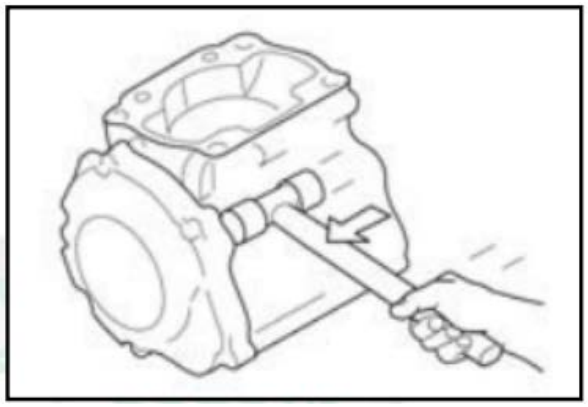
Tightening Torque

If a wrong torque is applied to a bolt, nut, or screw, the serious damage may be caused. It is necessary to tighten the fasteners with a good quality torque wrench in accordance with the specified torque.



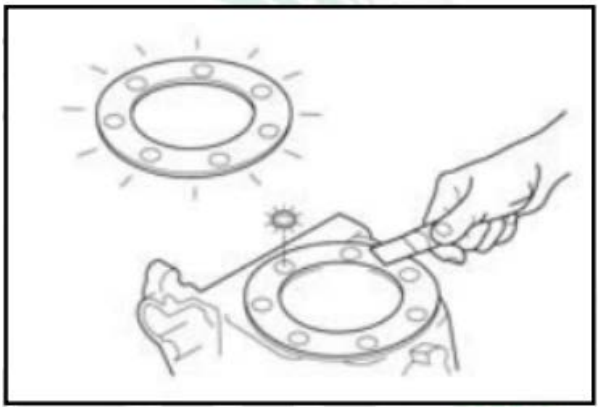
Force

The common sense and basic ability of judgement must be owned in the part removal and installation process to prevent excessive force from resulting in maintenance difficulties or high maintenance cost. If necessary, remove the screws with non-permanent locking agent by using a pneumatic wrench. If it is needed to beat the fastener, a rubber hammer must be used.



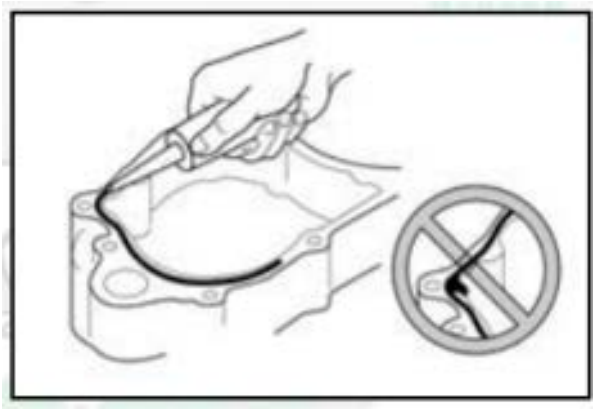
Gasket and O-Ring Seal

If the gasket and O-ring seal hardens, shrinks or is damaged after they are removed, the sealing performance will be reduced. Remove the old gasket and thoroughly clean the sealing surface to prevent any gasket material or other materials from remaining on the sealing surface. Use a new gasket during reinstallation and replace the O-ring seal which has been used simultaneously.



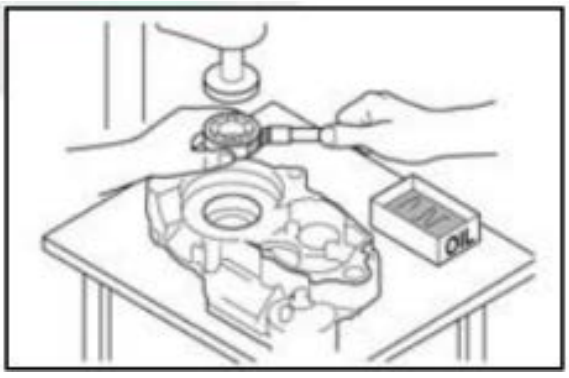
Silicone Sealant and Non-permanent Locking Agent

If it is needed to use the Silicone Sealant or Non-permanent Locking Agent, the contact surface must be cleaned first to prevent any oil stain from remaining on the contact surface before the Silicone Sealant and Non-permanent Locking Agent are used. Do not use too much Silicone Sealant or Non-permanent Locking Agent, because excessive Silicone Sealant or Non-permanent Locking Agent will block the oil channel and cause serious damages.



Press Fitting

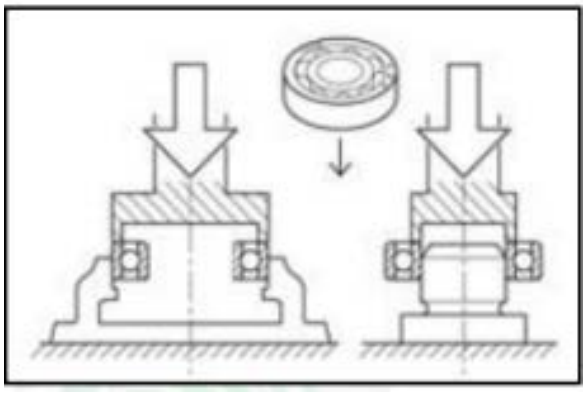
Bearings, oil seals and other parts can be fit in place only by press-fitting, so a small amount of oil shall be smeared on the contact parts. The parts must align in right position during installation and then the parts can be slowly pressed.



Ball Bearing and Needle Bearing

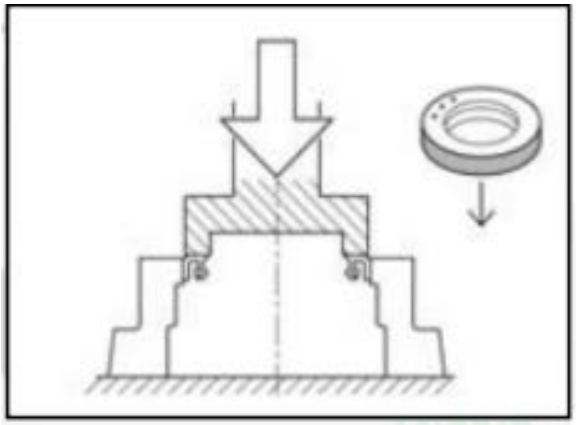
If not necessary, do not remove the ball or needle in the bearing. Once the ball or needle is removed, it must be replaced with a new one. When pressing the bearing, note that the manufacturer and size signs shall be placed outward. Apply force to the correct bearing race (as shown in the figure) and press the bearing in place.

If the force is applied to the wrong bearing race, the stress on inner race and outer race will produce, which will damage the bearing.

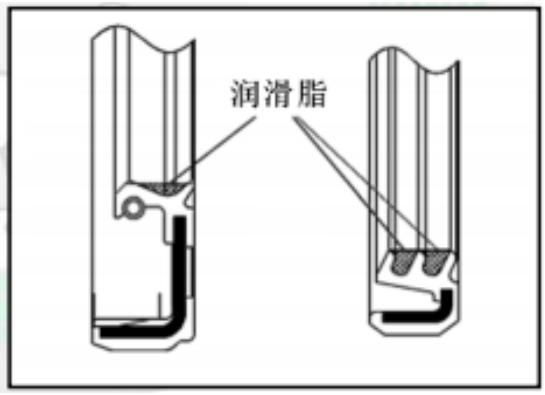


Oil Seal and Grease Oil Seal

If not necessary, do not remove the oil seal or grease oil seal which has been tightly sealed. Once it is removed, it must be replaced with a new one. When pressing the new oil seal, note that the manufacturer and size signs shall be placed outward. Make sure that the oil seal is correctly positioned.

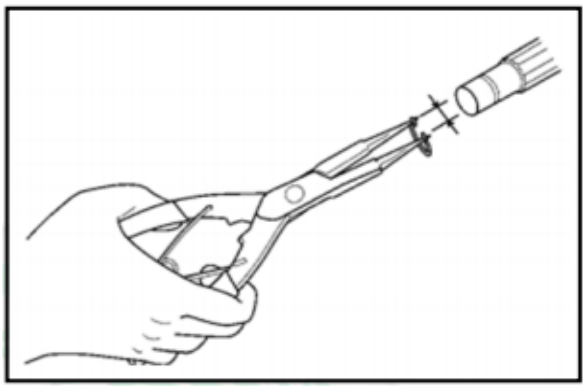


Smear the grease on the edges of oil seal in accordance with the specified quantity before it is installed.



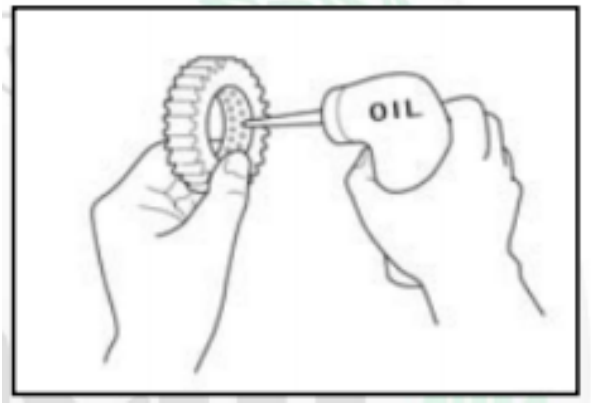
Circlip and Cotter Pin

Replace the removed circlip or cotter pin with a new one. In order to prevent deformation, the opening of circlip or cotter pin cannot be too large during installation.



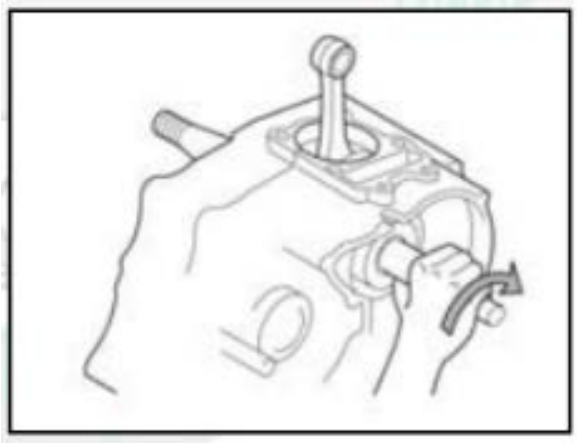
Lubrication

In order to minimize the abrasion during running-in, the lubricant must be applied to the rotating parts or sliding parts. The appropriate amount of lubricant or grease shall be injected in accordance with the specifications, and this Manual will give the various lubrication points.



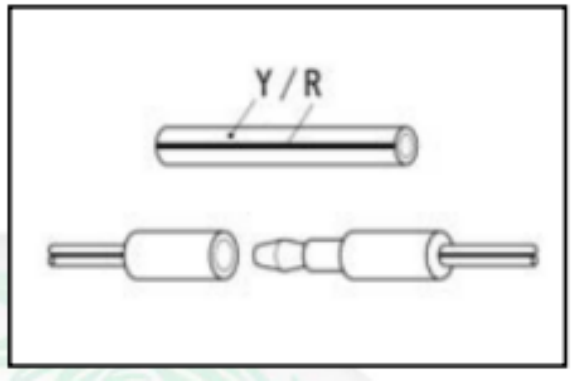
Rotation Direction of Engine

When the crankshaft is rotated by hands, the wrong free play amount adjustment will be caused if the rotation direction is wrong. So please rotate the crankshaft in the positive direction (clockwise direction from the output).



Wire

Dual-color wire: the first is the base color, then the color of stripe. Unless noted otherwise, only the wires with the same color can be connected.



Cable Connector Check

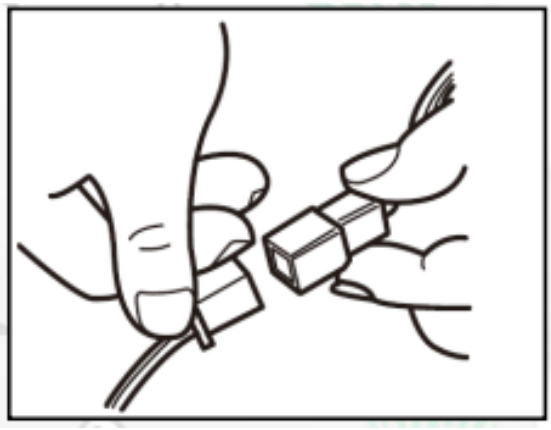
Make sure that there are no corrosion, moisture and other foreign materials on the connector.

1. Disconnection

Wire

Connector

Joint



2. Check

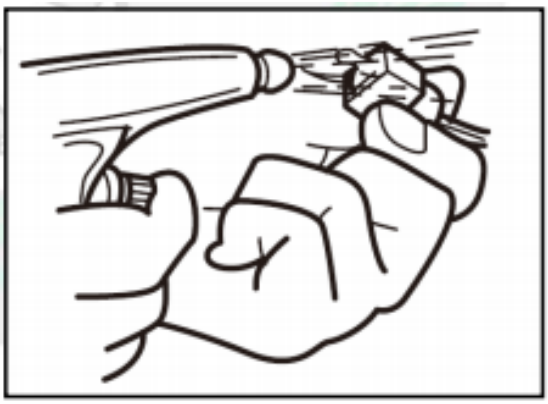
Wire

Connector

Joint

If there are moisture traces, use the compressed air to dry it.

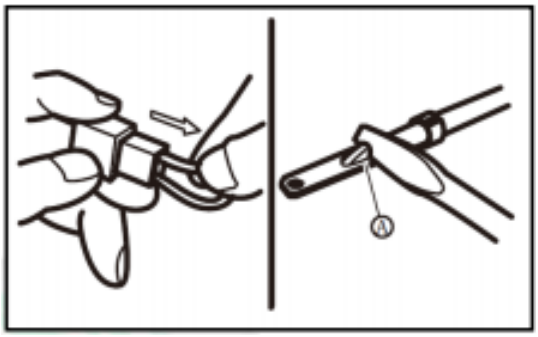
If there is corrosion, plug the connection parts for several times or use the rust remover, and replace the parts with serious corrosion timely.



3. Check

All connectors

If any joint is loose, conduct correct connection again.



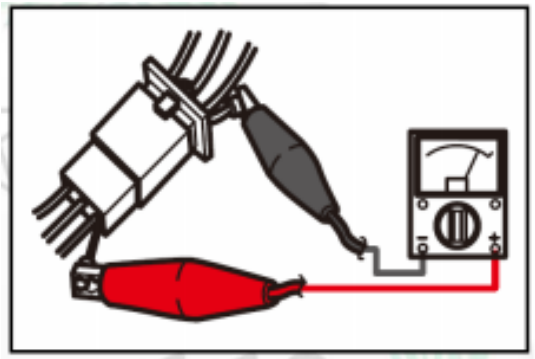
Note
If the “A” pin on the terminal is flat, please bend it.

4. Check

Wire

Connector

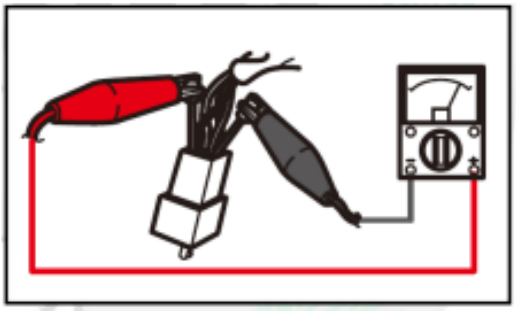
Joint



Note
Make sure that all joints are assembled firmly.

5. Check

Continuity (with multimeter)



Note
If there are no items to be checked, please wash the terminals. **When checking the wire sheath, please carry out the operations in accordance with Steps 1 to 3** **If you want to correct the operations rapidly, please use the [Contactor Reducer] sold in many spare parts shops.**

Cable Arrangement

Loose cable is a potential electrical safety hazard. Check the latter cable after the cable is clamped to ensure the electrical safety;

It is not allowed to bend the cable clamp in the direction of welding spot;

Bind the cables at the specific position;

It is not allowed to arrange the cables at the end of frame or at the position of sharp corner;

It is not allowed to arrange the cables at the end of bolts or screws;

The position of heat source or the position where the cables may be clogged shall be avoided during cable arrangement;

The cables shall not be pulled too tightly or too loosely and shall not interfere with any adjacent part in any turning position when they are arranged along the faucet handle;

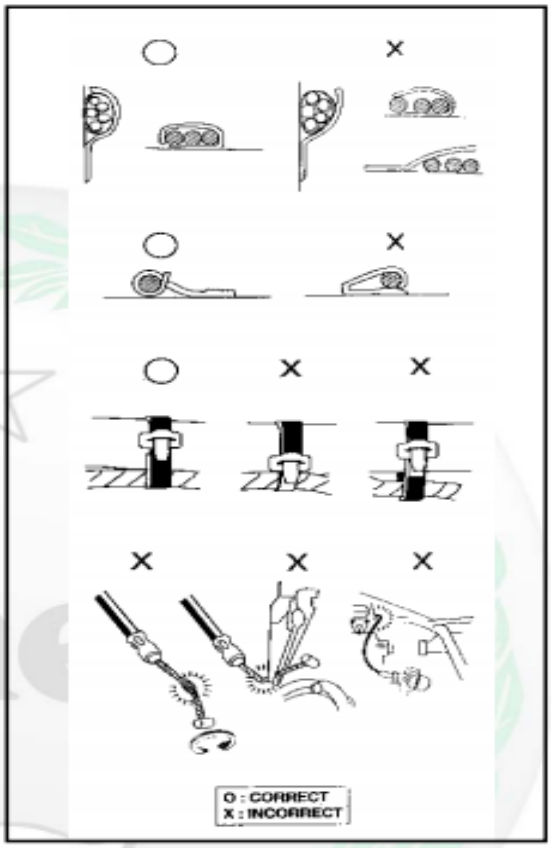
The cables shall be arranged smoothly without distortion or tangle;

Make sure whether the connector sheath is damaged or whether the connector is opened excessively before the connector is docked.

If the cable is at the position of sharp corner or corner, please protect it with tape or hose;

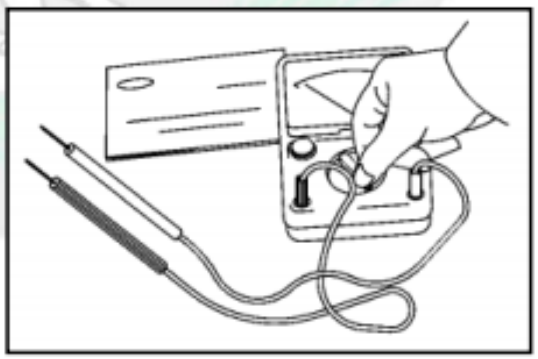
After the cable is repaired, bind up the bare parts reliably with tape;

The control cables shall not be bent or twisted. If the control cables are damaged, the manipulation will not be flexible;



Tool

In order to make the measurement results accurate, the instrument with accurate scale shall be used. Read the instructions provided by the manufacturer carefully before using the instrument. Inaccurate measured values may affect the adjustment results.



Model Information

China

BJ250-15A (a1-1) Left view

BJ250-15A (a1-1) Right view

BJ250-15A (a2-1) Left view

BJ250-15A (a2-1) Right view

Europe

BJ250-15 (Europe) Left view

BJ250-15 (Europe) Right view

Non-Europe

BJ250-15 (Non-Europe) Left view

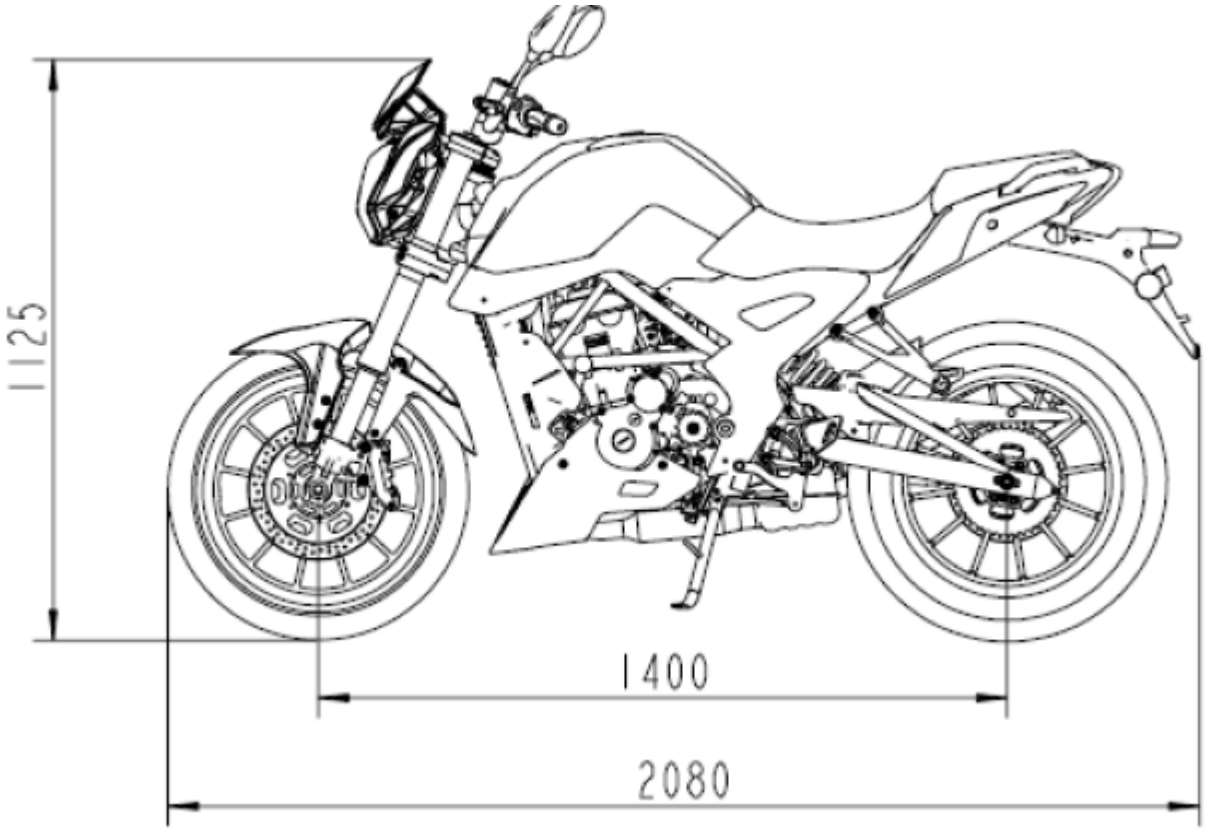
BJ250-15 (Non-Europe) Right view

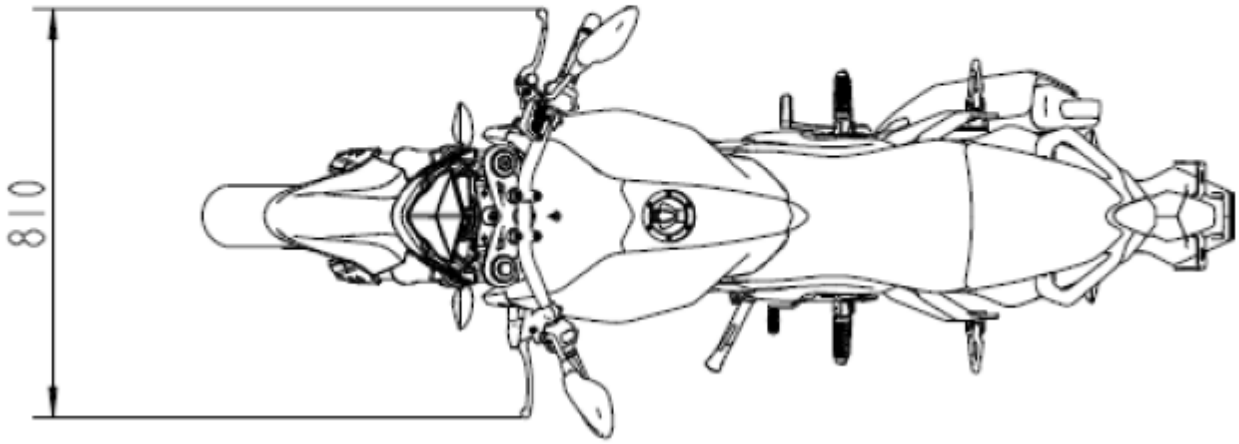
Frame No.

Engine No.

Basic Specification

Dimension	Standard
Overall length	2080mm
Overall width	810mm
Overall height	1125mm
Wheel base	1400mm





General Technical Parameter

Item	BJ250-15A、BJ250-15 (Non-Europe), BJ250-15 (Europe Ⅳ)
Dimension	
Overall length	2080mm
Overall width	810mm
Overall height	1125mm
Wheel base	1400mm
Ground clearance	mm
Height of seat	mm
Curb weight :	
BJ250-15A (a1-1)	155kg
BJ250-15A (a2-1)	155kg
BJ250-15 (Europe)	155kg
BJ250-15 (Non- Europe)	155kg
Front wheel axle load	
BJ250-15A (a1-1)	100kg
BJ250-15A (a2-1)	100kg
BJ250-15 (Europe)	100kg
BJ250-15 (Non- Europe)	100kg
Rear wheel axle load	
BJ250-15A(a1-1)	195kg
BJ250-15A(a2-1)	195kg
BJ250-15 (Europe)	195kg
BJ250-15 (Non- Europe)	195kg
Fuel tank capacity	17.0±0.3L
Rated maximum payload	150kg
Performance	
Minimum turning radius	5m
Engine	
Type	Four-stroke, double overhead camshaft, single cylinder
Cooling system	Liquid cooling type
Bore and stroke	72×61.2 mm
Displacement	249ml
Compression ratio	11.2：1
Maximum horsepower	18.5kW/9000rpm
Maximum torque	21.0N.m/7000rpm
Idle speed	1400±100rpm/min
Cylinder pressure	1.25MPa/1500rpm
Fuel injection system	EFI (Electronic fuel injection)
Start-up system	Electric starter
Ignition system	Battery and coil (full-crystal ignition system)
Ignition advance angle control	Electronic advance angle control (there is electronic igniter in ECU)
Ignition timing	From 10° BTDC @1 100 r/min (rpm)

General Technical Parameter

Item	BJ250-15A、BJ250-15 (Non-Europe), BJ250-15 (Europe Ⅳ)
Spark plug	NGK CR8E
Valve timing :	
Air inlet :	
Open valve	41°
Closed valve	71°
Total time interval	292°
Air exhaust:	
Open valve	64°
Closed valve	34°
Total time interval	278°
Lubrication system	Force lubrication and splash lubrication
Oil :	
Type	API SE, SF or SG
	API SH, SJ or SL (Include JASO MA, MA1 or MA2)
Viscosity	SAE 10W-50
Capacity	1.2±0.05L (In maintenance) ;
	1.5±0.05L (Engine is disassembled completely)
Driving mechanism	
Primary deceleration system :	
Type	Gear
Reduction ratio	3.043
Clutch type	Wet multiple-piece type
Transmission :	
Type	6-speed, regular mesh, reciprocating gear
Gear ratio :	
First	
Second	2.643
Third	1.833
Fourth	1.318
Fifth	1.040
Sixth	0.889
Final drive system :	0.786
Type :	
	Chain drive
Reduction ratio	3.462
Maximum design speed	125km/h
Gradeability	≥20°

General Technical Parameter

Item	BJ250-15A、BJ250-15 (Non-Europe)、BJ250-15 (Europe Ⅳ)
Frame	
Type	Steel Tube Trellis Frame
Caster angle (angle)	23°
Tail	94 mm
Front tire :	
Type :	Tubeless tire
Dimension :	110/70-17
Tire pressure	220±10kPa
Wheel type	12-spoke aluminium alloy
Rim dimension	17×MT3.50
Rim material	Aluminium alloy
Rear tire :	
Type	Tubeless tire
Dimension	140/60-17
Tire pressure	250±10kPa
Wheel type	12-spoke aluminium alloy
Rim dimension	17×MT4.50
Rim material	Aluminium alloy
Front suspension system :	
Type	Inverted, extension-sleeve, oil damping absorber
Total travel	125mm
Rear suspension system :	
Type	Monocular, hydraulic spring, damping absorber
Total travel	51mm
Brake type :	
Front wheel	Single disc φ280mm
Rear wheel	Single disc φ240mm
Electrical equipment	
Battery	12V-6Ah
Head lamp :	
Type	Semi-closed reflected light beam
Bulb:	
High beam lamp	(Quartz halogen lamp)
Low beam lamp	(Quartz halogen lamp)
Tail light/stoplight	12V/(LED)
Alternating-current generator:	
Type :	Three-phase alternating-current generator
Rated output power	12.8V//225W/5000rpm

If some changes are made, there will be no further notice and the changes may not be applicable in every country.

Unit Conversion Table

Prefix of unit:

Prefix	Symbol	Power
mega	M	×1000000
kilo	k	×1000
centi	c	×0.01
milli	m	×0.001
micro	μ	×0.000001

Unit of mass:

kg ×2.205=lb

g × 0.03527 = oz

Unit of volume

L × 0.2642 = gallon (US)

L × 0.2200 = gallon (imp)

L × 1.057 = quart (US)

L × 0.8799 = quart (imp)

L × 2.113 = pint (US)

L × 1.816 = pint (imp)

mL × 0.03381 = ounce (US)

mL × 0.02816 = ounce (imp)

mL × 0.06102 = cubic inch

km/h × 0.6214 = mph

Mechanical unit:

N × 0.1020 = kg

N × 0.2248 = lb

kg ×9.807=N

kg ×2.205=lb

Unit of length:

km × 0.6214 = mile

m × 3.281 =foot

mm × 0.03937 = inch

Unit of torque:

N·m × 0.1020 = kgf·m

N·m × 0.7376 = ft·lb

N·m × 8.851 = in·lb

kgf·m × 9.807 = N·m

kgf·m × 7.233 = ft·lb

kgf·m × 86.80 = in·lb

Unit of pressure:

kPa × 0.01020 = kgf/cm²

kPa × 0.1450 = psi

kPa × 0.7501 = cmHg

kgf/cm² × 98.07 = kPa

kgf/cm² × 14.22 = psi

cmHg×1.333=kPa

Unit of speed:

km/h × 0.6214 = mph

Unit of Power:

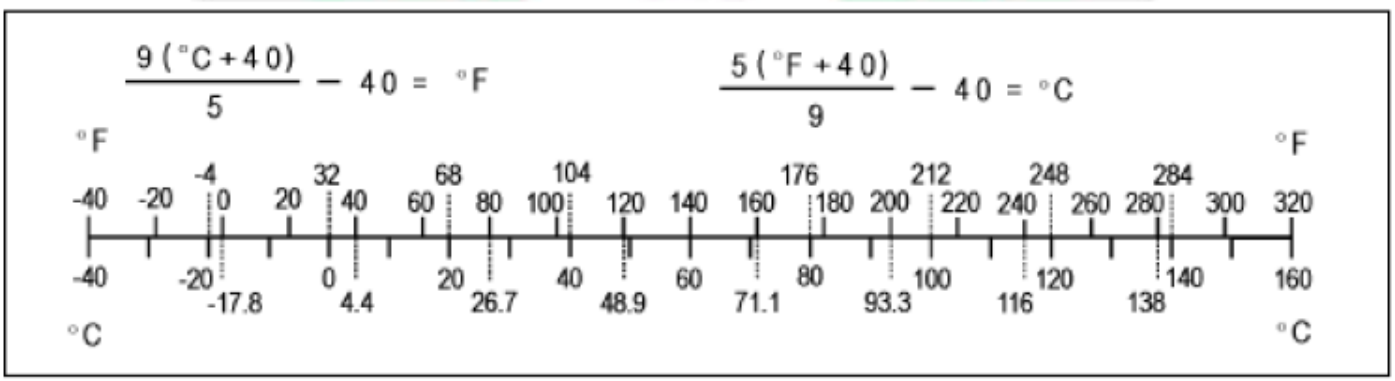
kW ×1.360=PS

kW ×1.341=HP

PS × 0.7355 = kW

PS × 0.9863 = HP

Unit of temperature:



CHAPTER II REGULAR MAINTENANCE

REGULAR MAINTENANCE TABLE 2-3

TORQUE AND LOCKING AGENT 2-5
- MAIN LOCKING TORQUE SPECIFICATIONS 2-5
- NUT, BOLT, SCREW FASTENING TORQUE AND RELATIVE PARAMETERS 2-9

REGULAR MAINTENANCE PROCEDURES 2-13
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Regular Maintenance Table

To keep good running state of motorcycle, regular maintenance must be conducted according to the following table. The maintenance for the first time is very important, so it should not be neglected.

Regular Check Table

Item \ Frequency	Whichever is the earlier ➡ Odometer reading ⬇ ×1000 km								Page
	Interval	1	6	12	18	24	30	36	
Fuel Injection System									Page 103
Throttle control system (running, smooth return, no clogging)—check	1 year	•		•		•		•	
Idle speed—check		•		.•		•		•	
Fuel leakage (fuel hose) —check	1 year	•		•		•		•	
Fuel hose damage —check	1 year	•		•		.•		.•	
Fuel hose installation state —check	1 year	•		•		-•		•	
Function of evaporative emission control system—check (model of CAL and SEA)									
Cooling system									
Coolant level—check		•		•		.•		•	
Coolant leakage (radiator hose and radiating pipe) —check	1 year	•		.•		•		•	
Damage of radiator hose—check	1 year	•		•		•		.•	
Radiator hose installation state —check	1 year	•		•		•		•	
Engine cylinder head and cylinder head cover									
Valve clearance —check: Model of US, CA, AU						•			
Valve clearance —check: Other models except US, CA, AU		Every 42000 km							
Damage of air suction system—check				•		•		•	
Clutch									
Clutch operation mechanism (running, detaching, engagement)—check		•		•		•		•	
Free play of clutch handle	1 year								
Wheels and tires									
Tire pressure—check	1 year			•		•		•	
Wheel/tire damage—check				•		•		•	
Tire tread wear, abnormal wear—check				•		•		•	
Wheel bearing damage—check	1 year			•		•		•	
Final drive mechanism									
Lubrication state of drive chain—check#	Every 600 km								
Drive chain loosening—check#	Every 1000 km								
Drive chain wear—check#				•		•		•	
Chain guide wear—check				•		•		•	
Brake									
Brake fluid leakage (brake hose)—check	1 year								
Damage of brake hose—check	1 year								
Installation state of brake hose—check	1 year								
Brake operation (effectiveness, running, no resistance)—check	1 year								
Brake fluid level—check	6 months								
Brake pad wear—check#									
Operation of brake lamp switch—check									

(Continued)

Item \ Frequency	Whichever is the earlier ⬇ / Odometer reading ➡ ×1000 km								Page
	Interval	1	6	12	18	24	30	36	
Suspension system									
Front fork / rear Damper operation (damping and travel is smooth)—check				•		•		•	
Oil leakage of front fork / rear Damper—check	1 year			•		•		•	
Rocker arm operation—check				•		•		•	
Tie-rod—check				•		•		•	
Steering system									
Steering clearance—check	1 year	•		•		•		•	
Steering rod bearing—lubrication	2 years					•			
Electrical system									
Lamp and switch operation—check	1 year							•	
Headlamp accuracy—check	1 year			•		•		•	
Operation of side stand switch—check	1 year			•		•		•	
Operation of engine stop switch—check	1 year			•		•		•	
Others									
Frame part—lubrication	1 year					•		•	
Tightness of bolts and nuts—check		•		•		•		•	
Air filter element —Clean#	Every 6000 km								
Air filter element —Replacement#	Every 12000 km								
Fuel hose—replacement	4 years						.•		
Coolant—replacement	3 years					•			
Radiator hose and O-ring seal—replacement	3 years					•			
Clutch hose—replacement	4 years						•		
Clutch oil—replacement	2 years				•		•		
Rubber parts of brake master cylinder/lower pump of clutch—replacement	4 years						•		
Oil—replacement#	1 year	•	•		•	•	•		
Oil filter—replacement	1 year	•	•		•	•	•		
Brake hose—replacement	4 years						•		
Brake fluid—replacement	2 years			•			•		
Rubber part of brake master cylinder of clutch / brake caliper—replacement	4 years						•		
Spark plug—replacement			.•		•	•	•	•	

#: In case of using motorcycle in dusty, wet and muddy environment and other severe environment or often operating it at high speed or frequently starting and stopping it, the maintenance frequency shall be increased.

*: If the odometer reading exceeds the number in this table, please repair it repeatedly according to frequency interval specified in this Manual

Torque and Locking Agent

Main Locking Torque Specifications

The following table shows the locking torque of the main fasteners that are to be used with screw fastening agent or silicone sealants.

The letters in “Remarks” column have the following meanings:

AL: Tighten the fastening bolts alternately twice in accordance with the higher locking torque.

G: Apply grease.

L: Apply non-permanent locking agent.

M: Apply grease containing molybdenum disulfide.

MO: Apply oil solvent containing molybdenum disulfide. (Mixture of oil and grease containing molybdenum disulfide prepared in a weight ratio of 10: 1)

R: Replacement parts.

S: Observe the specified tightening sequence.

Si: Apply silicone grease.

SS: Apply silicone sealant.

Fastener	Torque		Remarks
	N·m	kgf·m	
Fuel Injection System (EFI)			
Air filter element cover bolts	6	0.70	
Air filter cartridge support screw	6	0.70	
Camshaft position sensor bolt	10	1.0	
Crankshaft sensor bolt	5.9	0.60	
Pipe clamp bolt	2.0	0.20	
Fuel tank mounting bolt	10	1.0	
Fuel pump bolt	4	0.4	S
Intake air pressure sensor bracket screw	10	1.0	
Oxygen sensor	25	2.5	
ECU bolt	3.9	0.40	L
Speed sensor bolt	3.9	0.40	L
Coolant temperature sensor	25	2.5	
C**ooling system**			
Radiator mounting bolts (lower)	10	1.0	
Radiator mounting bolts (upper)	10	1.0	
Radiator (water pipe) hose fastening screws	2.0	0.20	
Expansion kettle mounting bolt	10	1.0	
Coolant drain bolt	10	1.0	
Thermostat cover mounting bolt	10	1.0	
Coolant pump cover bolt	10	1.0	
Coolant temperature sensor	25	2.5	
Engine cylinder head and cylinder head cover			
Cylinder head cover bolt	10	1.0	L
Camshaft sprocket mounting bolt	15	1.5	L
Camshaft cover bolt	10	1.0	S
Camshaft timing chain guide chain bolt	12	1.2	S
Camshaft timing chain tensioner mounting bolt	10	1.0	
Cylinder head bolt (M11)	50	5.0	L (3)
Exhaust pipe mounting bolt	22	2.2	
Spark plug	25	2.5	

(Continued)

Fastener	Torque		Remarks
	N·m	kgf·m	
Clutch			
Clutch cover bolt	10	1.0	L(1)
Clutch hub nut	120	12.0	R
Clutch spring bolt	10	1.0	
Engine lubrication system			
Oil drain bolt M12	30	3.0	
Oil plug	-	-	Tighten it with hands
Oil pump bolt	10	1.0	
Oil pump cover bolt	10	1.0	
Crankshaft / transmission mechanism			
Balancer shaft fastening nut M14	40	4.0	
L&R Crankcase bolt M6	12	1.2	S
Crankcase bolt	12	1.2	S
Flywheel locking nut M25	100	10.0	
Driving gear nutM20	80	8.0	
Gear shifting and positioning plate bolt M6	12	1.2	
Disassembly / installation of engine			
Front bracket bolt of engine (M10)	45	4.5	S
Upper bracket bolt of engine (M8)	25	2.5	S
Upper mounting bolt of engine (M10)	50	5.0	AL, S
Front mounting bolt of engine (M10)	50	5.0	AL, S
Rear mounting bolt of engine (M10)	50	5.0	AL, S
Wheels / Tires			
Front axle fastening bolt	20	2.0	AL
Front axle	107	10.7	
Rear axle	150	15.0	
Rear axle nut	150	15.0	
Final drive mechanism			
Chain upper limit block bolt	10	1.0	L
Chain protection block bolt	10	1.0	L
Engine sprocket cover bolt	10	1.0	
Engine sprocket Nut	125	12.5	MO
Rear sprocket nut	50	5.0	
Speed sensor bolt	3.9	0.4	L
Brake			
Release valve	7.8	0.80	
Brake hose banjo bolt	25	2.5	
Brake handle pivot axle bolt	6	0.6	Si
Brake handle pivot axle bolt locking nut	6	0.6	
Brake pedal bolt	22	2.2	
Front brake disc mounting bolt	27	2.7	L
Front brake lamp switch screw	1.2	0.12	
Front brake master cylinder fluid reservoir can mounting bolt	1.2	0.12	
Front caliper mounting bolt	27	2.8	L
Front caliper mounting bolt	34	3.5	
Front brake master cylinder bleed valve	7.8	0.80	
Front brake master cylinder fastening bolt	11	1.1	S
Rear brake disc mounting bolt	27	2.8	L
Rear caliper mounting bolt	37	3.8	L

(Continued)

Fastener	Torque		Remarks
	N·m	kgf·m	
Rear caliper mounting bolt	25	2.5	
Rear brake master cylinder mounting bolt	10	1.0	
Rear brake master cylinder Tie-rod locking nut	10	1.0	
Suspension system			
Front axle fastening bolt	20	2.0	AL
Front Damper fastening bolt (upper)	22	2.0	
Front Damper fastening bolt (lower)	22	3.1	AL
Front Damper top plug	22	2.2	
Front damper piston rod nut	28	2.8	
Rear Damper bolt (upper)	45	4.5	
Rear shock absorber bolt (lower)	45	4.5	
Rear shock absorber nut (lower)	45	4.5	
Rear swing arm shaft nut	108	10.8	
Rear swing arm shaft	108	10.8	
Steering system			
Steering rod compression nut	35	3.5	AL
Steering rod locking nut	24	2.4	AL
Upper bridge fastening screw	25	2.5	
Handle positioning double-end stud fixing nut	45	4.5	AL
Handle bolt	25	2.5	L
Left switch compression screw	3.5	0.35	
Right switch compression screw	3.5	0.35	
Left handle rear compression bolt	10	1.0	
Left handle pivot axle bolt	6	0.6	
Left handle pivot axle bolt locking nut	6	0.6	
Balance block bolt	10	1.0	
Frame			
Front seat bolt	10	1.0	
Rear seat bolt	10	1.0	
Rear armrest bolt	22	2.2	
Rear mudguard bracket mounting seat mounting bolt	10	1.0	
Rear mudguard bracket mounting bolt	10	1.0	
Front left pedal bracket bolt	45	4.5	
Shift lever mounting seat bolt	10	1.0	
Gear shift assembly bolt	10	1.0	
Front right pedal bracket bolt	45	4.5	
Rear left pedal bracket bolt	25	2.5	
Rear right pedal bracket bolt	25	2.5	
Muffler cylinder mounting bolt	22	2.2	
Muffler cylinder rear bolt	22	2.2	
Muffler cylinder rear fastening bolt	22	2.2	
Side stand bolt	50	5.0	
Side stand bolt locking nut	45	4.5	
Side stand switch bolt	6	0.6	
Battery bracket bolt	10	1.0	

(Continued)

Fastener	Torque		Remarks
	N·m	kgf·m	
Electrical system			
Alternator cover bolt	10	1.0	
Alternator wire fixing plate bolt	10	1.0	L
Alternator Rotor Bolt	100	10.0	S
Crankshaft position sensor bolt	9.8	1.0	
Crankshaft sensor bolt	5.9	0.60	L
Crankshaft sensor cover bolt	9.8	1.0	L(1)
Engine grounding terminal bolt	10	1.0	
Front brake lamp switch screw	1.2	0.12	
Front steering lamp fixing nut	6	0.6	
Fuel level sensor bolt	10	1.0	L
Lower bracket bolt of headlamp	10	10	
Lower mounting bolt of headlamp	10	1.0	
Left switch compression screw	3.5	0.35	
License plate lampshade mounting bolt	0.90	0.09	
Oil pressure switch	15	1.5	SS
Oxygen sensor	25	2.5	
Rear turning lamp fixing nut	6	0.6	
Rectifier bolt	10	1.0	
Right switch compression screw	3.5	0.36	
Side stand switch bolt	6	0.6	L
Speed sensor bolt	3.9	0.40	L
Starting relay bolt	10	0.6	L
Starter motor wire joint nut	6	0.6	
Bond strap bolt	10	0.6	
Starter motor mounting bolt	10	1.0	
Starter motor terminal locking nut	6	0.6	

Nut, Bolt, Screw Fastening Torque and Relative Parameters

The following table shows the basic torques of bolt and nut (different thread diameters correspond to different tightening torques). This table is only applicable to the bolt and nut without the need for specific torque value. All the values in the following table are applicable to the thread cleaned using anhydrous solvent.

Nut Fastening Torque and Relevant Parameters

Nut	Basic fastening torque and torque	
	N·m	kgf·m
4	2.3	0.2
5	4.5	0.4
6	10	1.0
8	25	2.5
10	45	4.5
12	80	8.0
14	130	13.0
16	200	20.0
18	240	24.0
20	325	32.5

Bolt and Screw Fastening Torque and Relevant Parameters

Bolt/screw	Basic fastening torque					
	Level 8.8		Level 10.9		Level 12.9	
	N·m	kgf·m	N·m	kgf·m	N·m	kgf·m
M4×0.7	3	0.3	4.2	0.4	5.2	0.5
M5×0.8	6	0.6	7.5	0.8	9	0.9
M6×1	10	1.0	13	1.3	16	1.6
M8×1.25	22	2.2	30	3.0	40	4.0
M8×1(*)	25	2.5	36	3.6	45	4.5
M10×1.5	45	4.5	65	6.5	80	8.0
M10×1.25(*)	50	5.0	70	7.0	85	8.5
M12×1.75	80	8.0	110	11.0	135	13.5
M12×1.5(*)	85	8.5	120	12.0	145	14.5
M12×1.25(*)	90	9.0	130	13.0	150	15.0
M14×2	130	13.0	185	18.5	220	22.0
M14×1.5(*)	150	15.0	205	20.5	245	24.5
M16×2	200	20.0	280	28.0	335	33.5
M16×1.5(*)	225	22.5	310	31.0	360	36.0
M18×2.5	265	26.5	370	37.0	450	45.0
M18×1.5(*)	320	32.0	450	45.0	550	55.0
M20×2.5	390	39.0	550	55.0	650	65.0
M20×1.5(*)	440	44.0	630	63.0	750	75.0
M22×2.5	540	54.0	750	75.0	900	90.0
M22×1.5(*)	600	60.0	850	85.0	1000	100.0
M24×3	670	67.0	950	95.0	1130	113.0
M24×2(*)	750	75.0	1050	105.0	1250	125.0
*: it is fine thread						

Technical Parameters

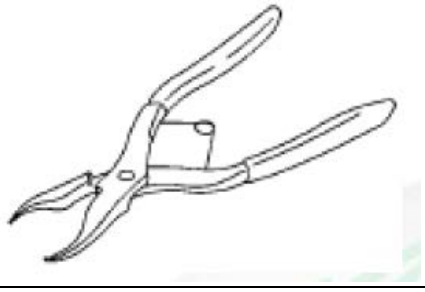
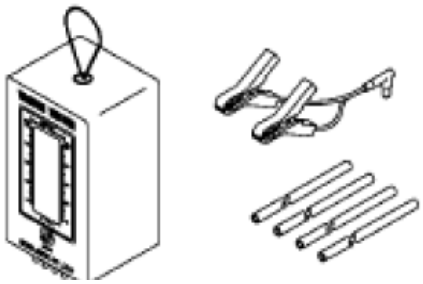
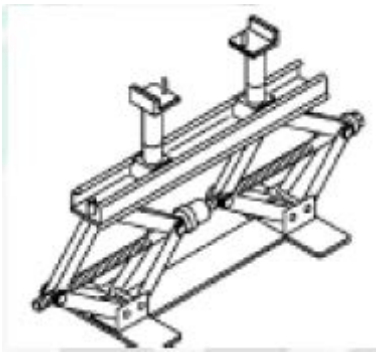
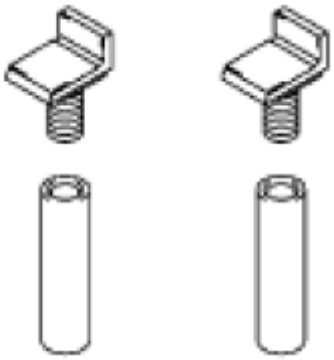
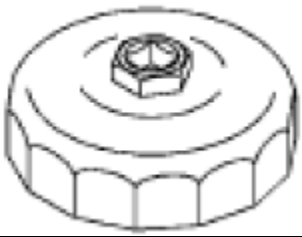
Item	Standard	Service limit
Fuel injection system (EFI)		
Free play of throttle grip	3-5mm	—
Idle speed	1400 ±100 r/min	—
Negative pressure value of throttle valve body	50 ±3 kPa (under idle speed)	—
Air filter element	Sponge filter	—
Cooling system		
Cooling fluid:		
Recommended type	FD-2 permanent antifreezing agent	—
Color	Green	—
Mixture ratio	50% soft water and 50% cooling fluid	—
Freezing point	-35℃	—
Boiling point	107℃	—
Total amount	1.2L	
Engine cylinder head and cylinder head cover		
Valve clearance:		
Exhaust value	0.15 -0.17 mm	—
Inlet valve	0.13 -0.15 mm	—
Clutch		
Free play of clutch lever	10 -20mm	—
Lubrication system of engine		
Oil:		
Type	API SE, SF or SG API SH, SJ or SL, JASO MA	—
Viscosity	SAE 10W-50	—
Capacity	1.2±0.05L (when replacement); 1.5±0.05L (complete disassembly of engine)	— —
Fluid level	Between the upper fluid level line and lower level line (idle speed or standing for 2-3 minutes after running)	—
Wheels / tires		
Tire tread depth		
Front tire	3.8 mm	1.6mm
Rear tire	4.8 mm	2.0mm
Tire pressure (after tire cooling):		
Front tire	220±10kPa	—
Rear tire	250±10kPa	—
Final drive mechanism		
Drive chain slacking	10-15 mm	—
Drive chain wearing (length of 20 Links)	317.5 -318.2 mm	323 mm
Standard drive chain:		
Model	520HO	—
Link	118	—

(Continued)

Item	Standard	Service Limit
Brake		
Brake fluid:		
Level	DOT4	—
Thickness of brake lining		
Front brake lining	4.0 mm	3mm
Rear brake lining	5.0 mm	4mm
Brake lamp time setting:		
Front brake lamp	It will be on after being pulled	—
Rear brake lamp	It will be on after pressing about 10mm pedal travel	—
Electrical system		
Spark plug		
Model	NGK CR8E	—
Clearance	0.6 -0.7 mm	—

Special Tools

The following special tools are needed for complete and correct adjustment and assembly; use the correct special tools to avoid the damages caused by improper tools or non-professional technology. In different countries, the specific tools which need to be used may vary. During ordering tools, please refer to the following information to prevent any errors.

Inner circlip plier	Vacuum meter
	
BN-BN-43008-622steering special nut 4T wrench	steering special nut 7T wrench BN-BN-43009-622
Jack:	Jack accessories:
	
Oil filter wrench (§ 66.5mm)	
	

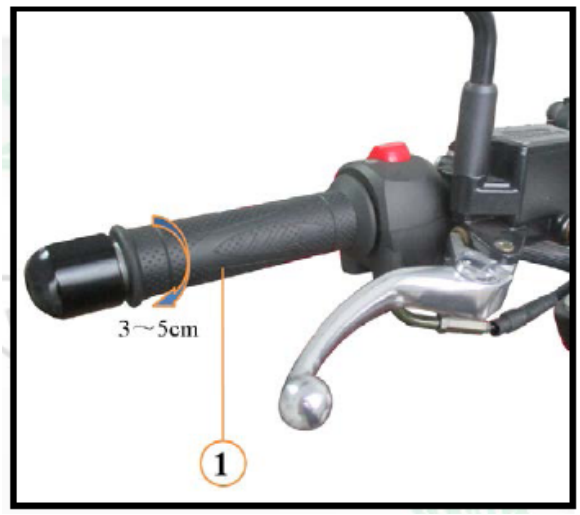
Fuel Injection System (EFI)

Checking Throttle Control System

• Check the free play of throttle grip ①.

Free play of Throttle Grip

Standard: 3-5mm



★If the free play is not accurate, please adjust the throttle cable.

• Check whether the throttle grip can move smoothly from fully open to closed and whether the return spring can enable the throttle to be turned off completely at any steering position.

★If the throttle grip cannot be reset normally, check whether the winding method of throttle cable, free play of handle or cable is damaged. Then add the lubricant to the throttle cable.

• Make the engine idle and turn the direction to the right and left to ensure no change in idle speed.

★If the idle speed is increased, check the free play and winding method of throttle cable.

★If necessary, adjust the throttle cable A in accordance with the following steps:

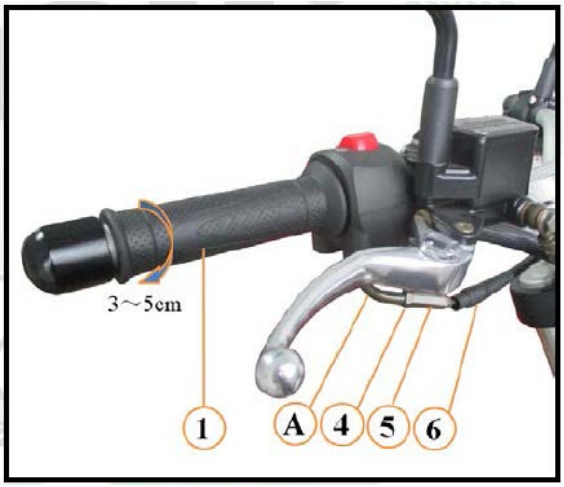
(1) Remove the dirt-proof boot of throttle cable ⑥.

(2) Loosen the locknut ④.

(3) Rotate the adjusting nut ⑤ until the free play of throttle grip ① is 3-5mm.

(4) Tighten the locknut ④.

(5) After the free play is adjusted, turn the direction to the right and left to confirm that there is no change in idle speed of engine.



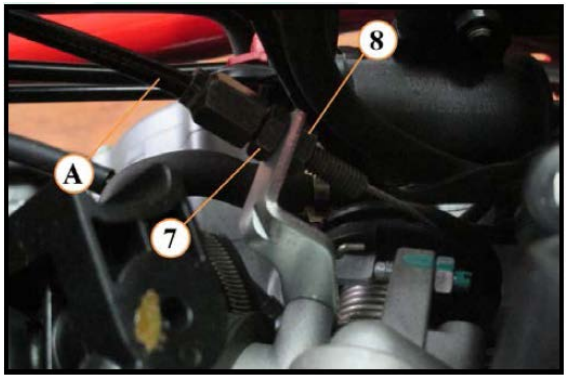
★If the free play of throttle grip cannot be met by adjusting the upper end of throttle cable, adjust the lower end of throttle cable and adjust the throttle cable according to the following steps:

(1) Unscrew the locknut ⑧.

(2) Rotate the adjusting nut ⑦ so that the free play of throttle grip is large enough until the free play of throttle grip is 3-5mm.

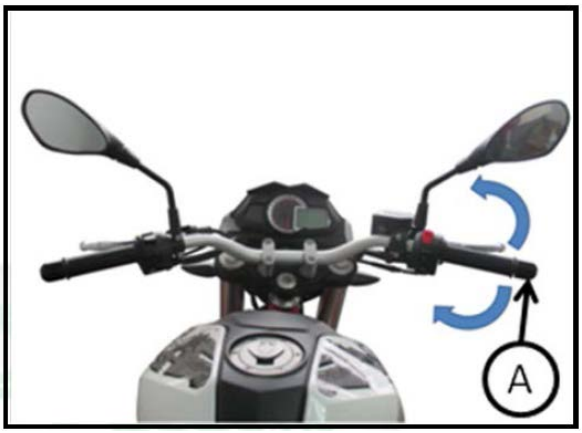
(3) Tighten the locknut ⑧.

(5) After the free play is adjusted, turn the direction to the right and left to confirm that there is no change in idle speed of engine.



★If the free play cannot be adjusted by the adjuster, change the wire.

Checking Idle Speed



• Start the engine and make it hot thoroughly.

• When the engine is idling, rotate the handlebar to both sides [A].

★If the idle speed was changed when rotating the handlebar, it indicates that the throttle cable is not adjusted well or the winding method is incorrect or damaged. Before riding, make sure to correct the above problems (see the sections of “Accessory” chapter: “Checking Throttle Control System” and “Winding Method of Cable, Wire and Hose”).

⚠Warning

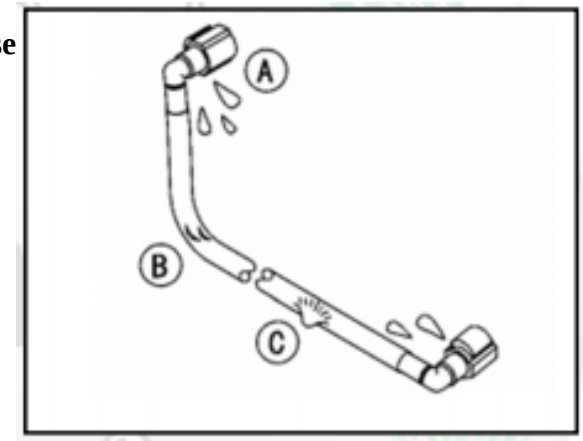
If you ride when the cables are not adjusted well or damaged or the winding method is incorrect, the safety accident will be caused.

• Checking Idle Speed

Idle Speed

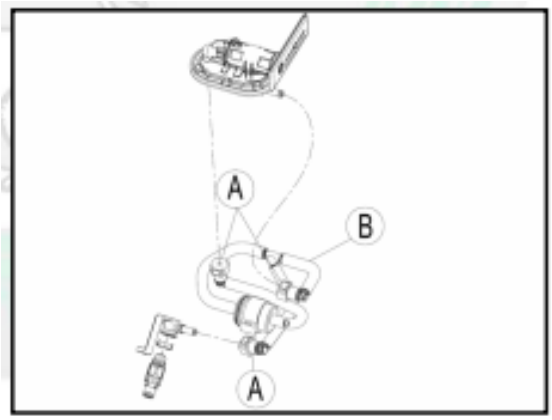
Standard: 1400±100 r/min

Checking Fuel Hose (Fuel Leakage, Hose Break and Hose Installation Situations)



〇If the motorcycle is not handled properly, the high pressure inside the fuel hose can lead to fuel leakage [A] or fuel hose break. Remove the fuel tank (see “Fuel Tank Disassembly” in the “Fuel Injection System (EFI)” chapter) and check the fuel hose.

★If any wear, crack [B] or expansion [C] is found, the fuel hose must be replaced.



• Check whether the winding method of hose meets the relevant specifications of the “Winding Method of Cable, Wire and Hose” section of the “Accessory” chapter.

★If the hose is bent or broken seriously, it needs to be replaced.

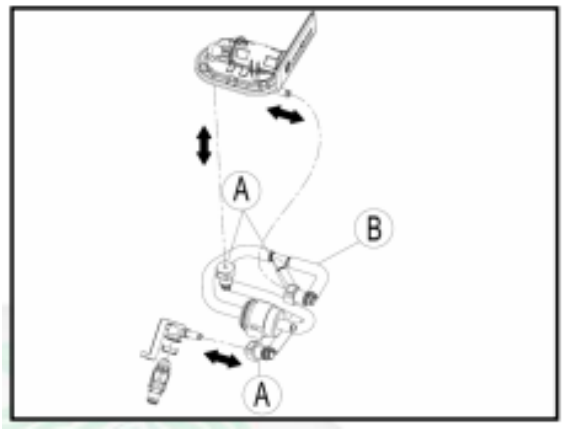
Hose joint [A]

Fuel hose [B]

• Check whether the connection of hose joint is firm.

〇Push and pull the hose joint [A] for more than twice to ensure that the hose joint is fixed firmly.

★If the connection is not firm, install the hose joint again.



⚠Warning

Slide the joint to ensure that the hose joint is properly installed on the fuel supply pipe, otherwise the fuel leakage may occur.

Checking Fuel Evaporation and Recovery System (Chinese, European and US Models)

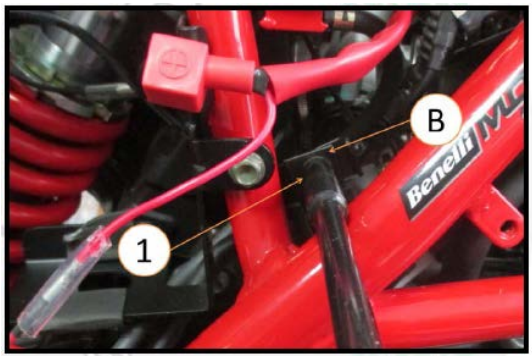
• Check the carbon canister solenoid valve according to the following steps.

〇Remove the seat (see “Seat Disassembly” in “Frame” chapter).

〇Remove the right side cover (see “Side Cover Disassembly” in “Frame” chapter).

〇Remove the battery (see “Battery Disassembly” in “Battery” chapter).

〇Remove the carbon canister solenoid valve bracket B.

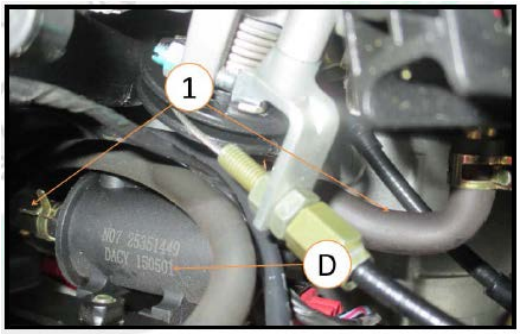


〇Remove the hose [1] used to connect separator and remove the carbon canister solenoid valve [D] from the right side of motorcycle.

〇Check whether there are cracks or other damages on the carbon canister solenoid valve.

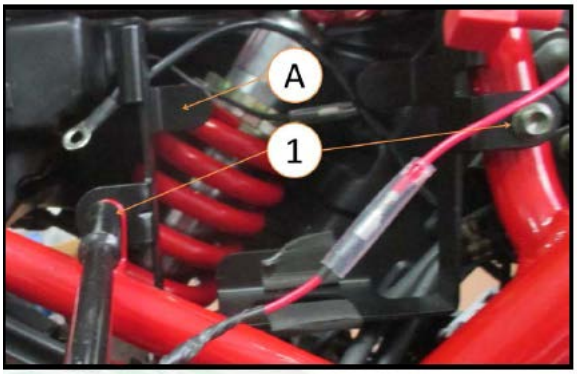
★If any, it must be replaced.

★Check the carbon canister solenoid valve (see “Carbon Canister Solenoid Valve” in “Fuel Injection System (EFI)”)



• Check the carbon canister according to the following steps.

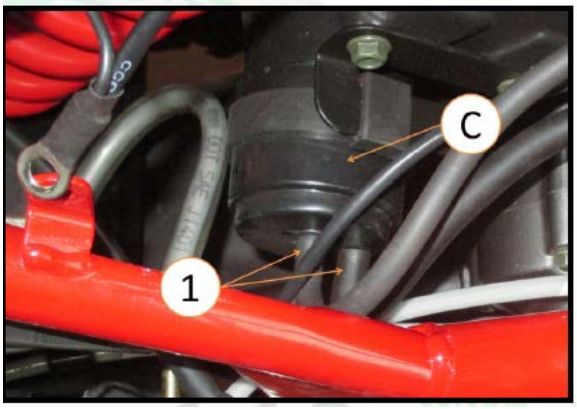
〇Remove the battery bracket A.



〇Remove the carbon canister [C] and the hose [1] used to connect carbon canister.

〇Check whether there are cracks or other damages on the carbon canister.

★If any, it shall be replaced with a new one.



Remark
If the carbon canister is used under normal situations, it can be used normally within the service life of the motorcycle without maintenance.

• Check the hose of fuel evaporation and recovery system according to the following steps.

〇Check whether the hose is connected firmly and whether the clamps are in place.

〇Replace the broken, corrosive or damaged hoses.

〇Install the negative pressure hose according to the “Winding Method of Cable, Wire and Hose” section in the “Accessory” chapter.

〇When the hose is installed, avoid bending, tangling or twisting the hose excessively and do not bend the hose as much as possible so as to prevent the blocking caused by evaporative emission.

Cooling System

Checking Coolant Level

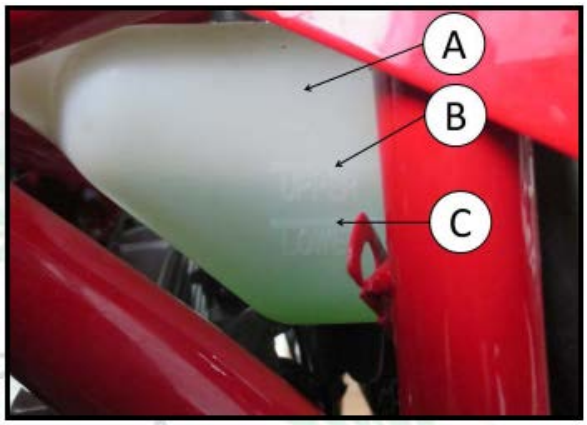
Remark
○**Check the fluid level when the engine is cooled (to the indoor temperature or environment temperature).**

• Put the motorcycle vertically (do not use the side stand) and check the coolant level of the reserve tank [A].

★If the coolant level is lower than the “LOWER” fluid level line [C], unscrew the cover of reserve tank and add the coolant until the fluid level reaches the “UPPER” fluid level line [B].

“UPPER”: full

“LOWER”: low



Note
When adding the coolant, the specified mixture of coolant and soft water needs to be added. If water is added separately, the coolant will be diluted to reduce the anti-corrosion performance. The diluted coolant will corrode the aluminum engine parts. In case of emergency, soft water can be added separately. But the correct mixing ratio must be restored within a few days. **If the coolant must be added frequently or the reserve tank is completely dry, the leakage problems may occur in the cooling system. Check whether the leakage occurs in the cooling system, because the coolant will corrode the painted surface. If the coolant is splashed on the frame, engine, wheel or other painted parts, rinse them with water immediately.**

Check Radiator Pipe (Coolant Leakage, Radiator Pipe Damage and Installation State of Radiator Pipe)

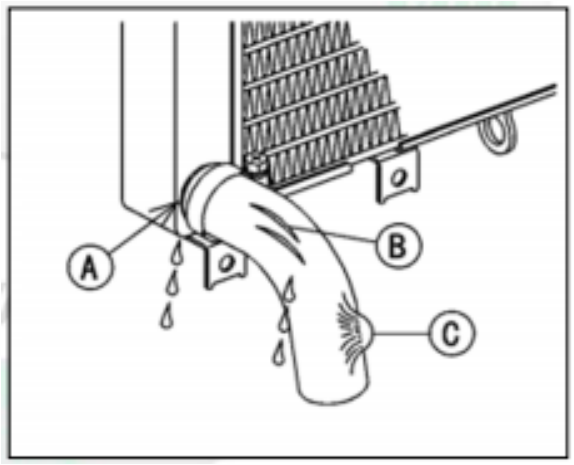
○If the radiator pipe is not properly maintained, the high pressure inside the coolant pipe will cause the coolant leakage [A] or rupture of coolant pipe.

• Check whether the hose is corroded. After the hose is extruded, if the hose becomes hard, brittle or expanded, it indicated that the hose has been corroded.

★If any wear, crack [B] or expansion [C] is found, the hose must be replaced.

• Check whether the hose is connected firmly and whether the clamp has been fastened correctly.

Tightening torq**ue of radiator (coolant) pipe fastening screw: 2.0 N·m**

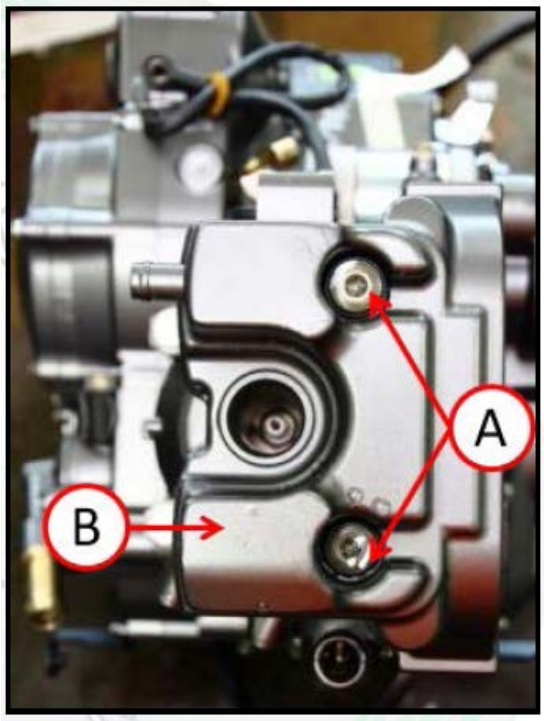


Engine Cylinder Head and Cylinder Head Cover

Check Valve Clearance

Remark
○**Valve clearance can be checked and adjusted only when the engine is cooled (to the indoor temperature).**

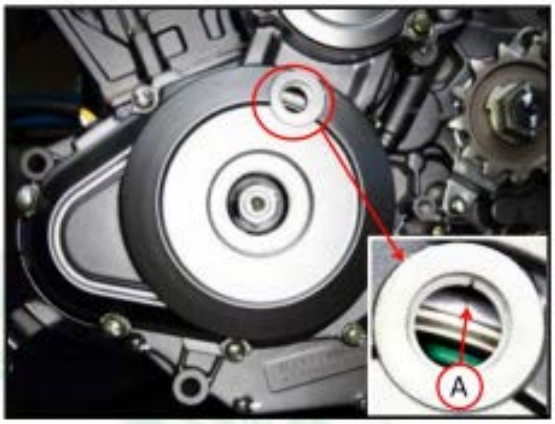
●Removal:
Remove the seat (see “Disassembling Seat” in “Frame” chapter),
Remove the fuel tank (see “Disassembling Fuel Tank” in “Fuel Tank” chapter),
●Disassemble the mounting bolt [A] and remove the cylinder cover [B]



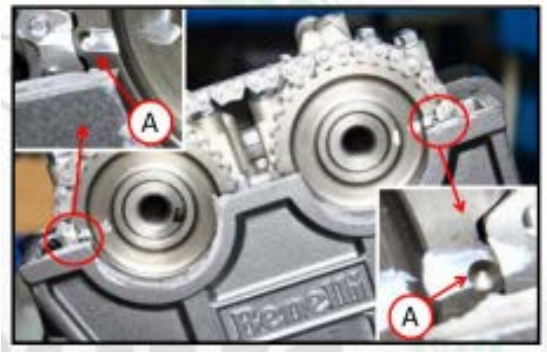
Note
Please check the damaged or distorted rubber gasket [A], especially around the spark plug. If the rubber gasket is damaged, replace it with a new one.

●Place the crankshaft on the piston TDC

○TDC sign of flywheel is [A]

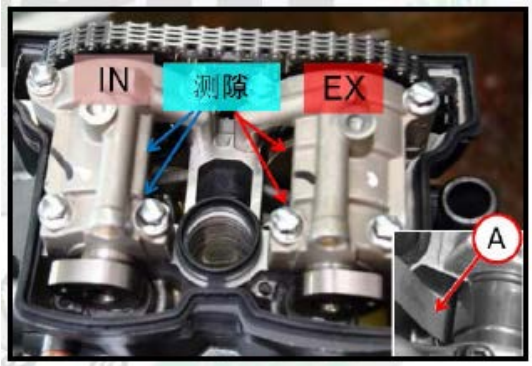


○Timing sign: [A] (Half meshing surface of crankcase)



●Use the thickness gauge [A] to measure the valve clearance between cam and valve lifter at the TDC position.

Note
Please keep the thickness gauge level to prevent that the misjudgement gets stuck.



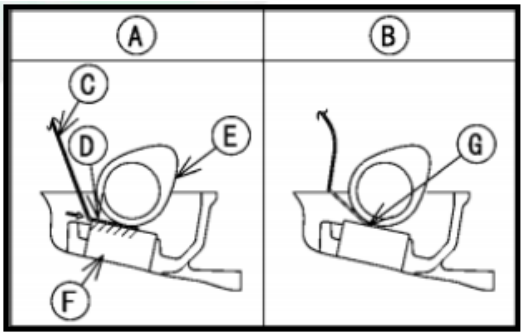
Valve clearance

Standard:

Inlet valve: 0.13-0.15 mm

Exhaust valve: 0.15-0.17 mm

Note
Thickness gauge shall be inserted in the valve lifter horizontally.



Proper: [A]

Improper: [B]

Feeler: [C]

Horizontally insertion: [D]

Cam: [E]

Valve lifter: [F]

The front end of feeler is stuck on the valve lifter, which is a wrong method: [G]

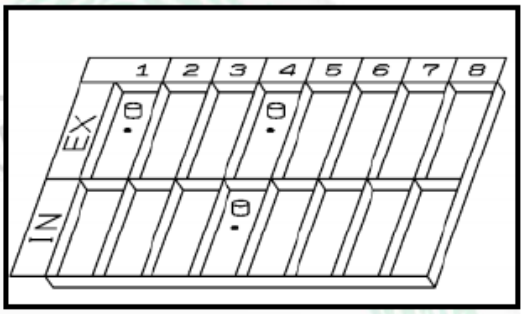
★If the valve clearance is not within the specified scope, record the valve clearance and then carry out the adjustment.

Adjusting Valve Clearance

●To change the valve clearance, remove the camshaft chain tightener, camshaft and valve lifter. Replace the valve shim used currently with that with different thickness.

Remark
In order to install the valve lifter and valve shim at the original positions, mark their positions before removal.

○In addition to the standard valve shims in the valve clearance adjustment table, the following valve shims can also be used.



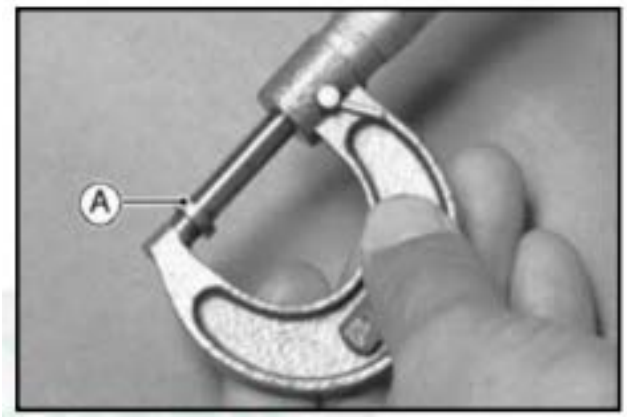
Adjusting Valve Shim:

Adjusting Valve Shim

Code	Thickness
120246030000	Valve adjustment shim1.600mm Valve adjustment shim 1.600mm
120216030000	Valve adjustment shim 1.625mm
120226030000	Valve adjustment shim 1.650mm
120236030000	Valve adjustment shim 1.675mm
120256030000	Valve adjustment shim 1.700mm
120266030000	Valve adjustment shim 1.725mm
120276030000	Valve adjustment shim 1.750mm
120286030000	Valve adjustment shim 1.775mm
120296030000	Valve adjustment shim 1.800mm
120306030000	Valve adjustment shim 1.825mm
120316030000	Valve adjustment shim 1.850mm
120326030000	Valve adjustment shim 1.875mm
120336030000	Valve adjustment shim 1.900mm
120346030000	Valve adjustment shim 1.925mm
120356030000	Valve adjustment shim 1.950mm
120366030000	Valve adjustment shim 1.975mm
120376030000	Valve adjustment shim 2.000mm
120386030000	Valve adjustment shim 2.025mm
120396030000	Valve adjustment shim 2.050mm
120406030000	Valve adjustment shim 2.075mm
120416030000	Valve adjustment shim 2.100mm
120426030000	Valve adjustment shim 2.125mm
120436030000	Valve adjustment shim 2.150mm
120446030000	Valve adjustment shim 2.175mm
120456030000	Valve adjustment shim 2.200mm
120466030000	Valve adjustment shim 2.225mm
120476030000	Valve adjustment shim 2.250mm
120486030000	Valve adjustment shim 2.275mm

●Clean the dust or oil stain on the valve shim.

●Measure the thickness of the removed valve shim [A].



Valve Clearance Adjustment Table of Exhaust Valve

Examples of valve clearance measurement valve (mm)	Examples of current valve shim																				
Thickness (mm)	1.3	1.35	1.4	1.45	15	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	215	2.2	2.25	2.3
0.00～0.02	—	—	—	—	—	1.3	1.35	1.4	1.45	15	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05
0.03～0.06	—	—	—	—	1.3	1.35	1.4	1.45	15	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1
0.07～0.10	—	—	—	1.3	1.35	1.4	1.45	15	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15
0.11～0.14	—	—	1.3	1.35	1.4	1.45	15	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2
0.15～0.18	—	1.3	1.35	1.4	1.45	15	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25
0.19～0.25	Valve clearance/without adjustment																				
0.26～0.30	1.35	1.4	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3	
0.31～0.35	1.4	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3		
0.36～0.40	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3			
0.41～0.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3				
0.46～0.50	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3					
0.51～0.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3						
0.56～0.60	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3							
0.61～0.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3								
0.66～0.70	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3									
0.71～0.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3										
0.76～0.80	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3											
0.81～0.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3												
0.86～0.90	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3													
0.91～0.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3														
0.96～1.00	2.05	2.1	2.15	2.2	2.25	2.3															
1.01～1.05	2.1	2.15	2.2	2.25	2.3																
1.06～1.10	2.15	2.2	2.25	2.3																	
1.11～1.15	2.2	2.25	2.3																		
1.16～1.20	2.25	2.3																			
1.21～1.25	2.3																				

Thickness of valve shim to be installed (mm)

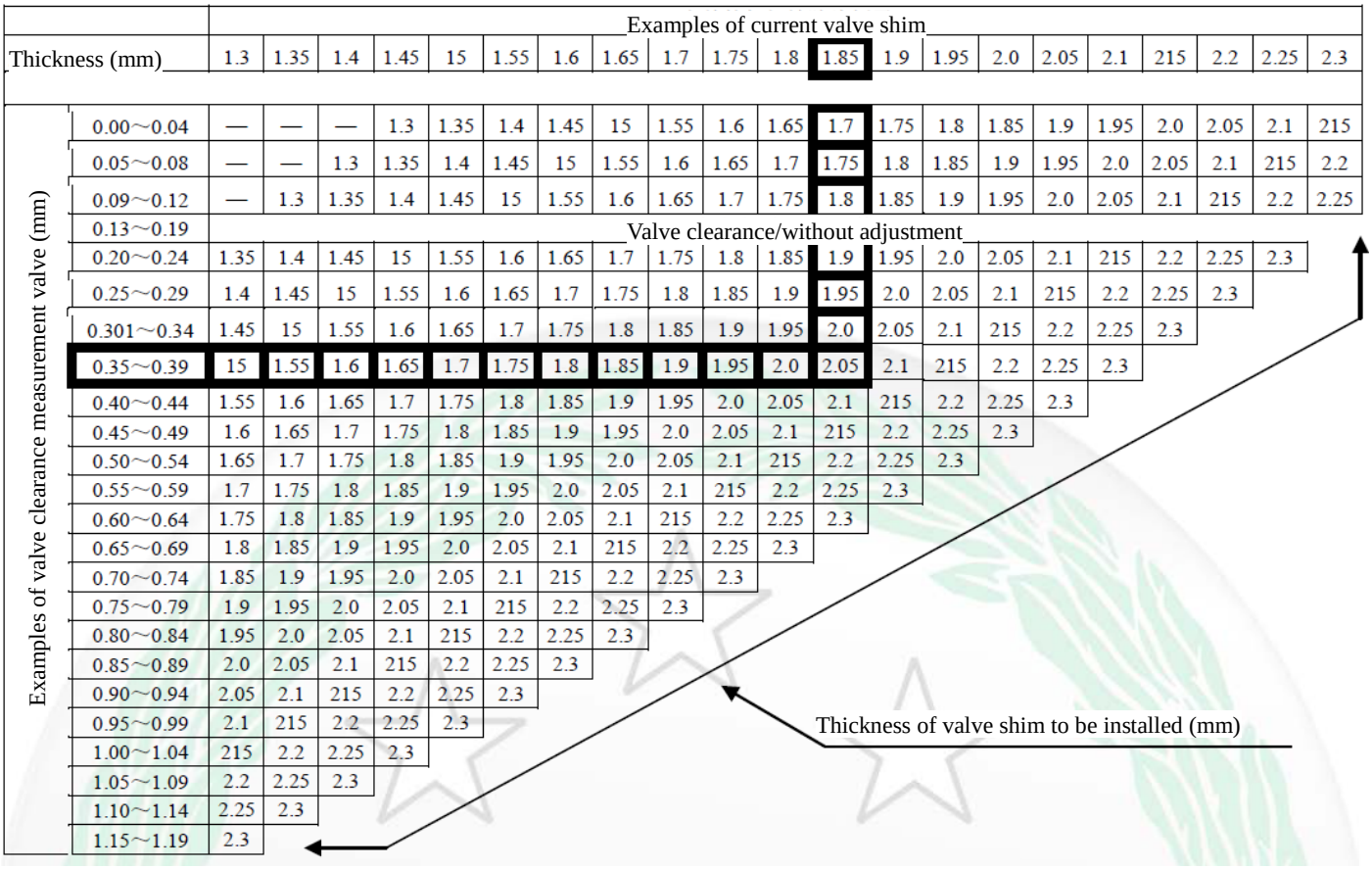
1. Measure the valve clearance (the engine has been cooled).
2. Check the current valve shim dimension.
3. The valve clearance in the vertical column corresponds to the current valve shim dimension in the horizontal column.
4. The value in the space crossed by the vertical column and horizontal column refers to the specified valve shim dimension. When the valve shim dimension is equal to the value in the space, the valve clearance value is just appropriate.

   For example: the thickness of current valve shim is 1.60 mm.

   The measured valve clearance is 0.33 mm.

   Replace the shim of 1.60 mm with the valve shim of 1.70 mm.
5. Measure the valve clearance again and carry out adjustment again if necessary.

Valve Clearance Adjustment Table of Inlet Valve



Thickness (mm) / Examples of valve clearance measurement valve (mm)	Examples of current valve shim																					
	1.3	1.35	1.4	1.45	15	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	215	2.2	2.25	2.3
0.00～0.04	—	—	—	1.3	1.35	1.4	1.45	15	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	215
0.05～0.08	—	—	1.3	1.35	1.4	1.45	15	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	215	2.2
0.09～0.12	—	1.3	1.35	1.4	1.45	15	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	215	2.2	2.25
0.13～0.19	Valve clearance/without adjustment																				
0.20～0.24	1.35	1.4	1.45	15	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	215	2.2	2.25	2.3	
0.25～0.29	1.4	1.45	15	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	215	2.2	2.25	2.3		
0.301～0.34	1.45	15	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	215	2.2	2.25	2.3			
0.35～0.39	15	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	215	2.2	2.25	2.3				
0.40～0.44	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	215	2.2	2.25	2.3					
0.45～0.49	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	215	2.2	2.25	2.3						
0.50～0.54	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	215	2.2	2.25	2.3							
0.55～0.59	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	215	2.2	2.25	2.3								
0.60～0.64	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	215	2.2	2.25	2.3									
0.65～0.69	1.8	1.85	1.9	1.95	2.0	2.05	2.1	215	2.2	2.25	2.3										
0.70～0.74	1.85	1.9	1.95	2.0	2.05	2.1	215	2.2	2.25	2.3											
0.75～0.79	1.9	1.95	2.0	2.05	2.1	215	2.2	2.25	2.3												
0.80～0.84	1.95	2.0	2.05	2.1	215	2.2	2.25	2.3													
0.85～0.89	2.0	2.05	2.1	215	2.2	2.25	2.3														
0.90～0.94	2.05	2.1	215	2.2	2.25	2.3															
0.95～0.99	2.1	215	2.2	2.25	2.3																
1.00～1.04	215	2.2	2.25	2.3																	
1.05～1.09	2.2	2.25	2.3																		
1.10～1.14	2.25	2.3																			
1.15～1.19	2.3																				

Thickness of valve shim to be installed (mm)

1. Measure the valve clearance (the engine has been cooled).
2. Check the current valve shim dimension.
3. The valve clearance in the vertical column corresponds to the current valve shim dimension in the horizontal column.
4. The value in the space crossed by the vertical column and horizontal column refers to the specified valve shim dimension. When the valve shim dimension is equal to the value in the space, the valve clearance value is just appropriate.

   For example: the thickness of current valve shim is 1.85 mm.

   The measured valve clearance is 0.36 mm.

   Replace the shim of 1.85 mm with the valve shim of 2.05 mm.
5. Measure the valve clearance again and carry out adjustment again if necessary.

Note
After selecting other valve Shims according to the table above, please measure the valve clearance again. If the valve clearance exceeds the specified scope, use the supplement shim.

○If there is no valve clearance, use the valve shim which is several times smaller and then measure the valve clearance again.

●When installing the valve shim, the side with sign shall face to the valve lifter. At this time, apply a little oil to the valve shim or valve lifter so that the valve shim is at the appropriate position when installing the camshaft.

Note
Do not use multiple valve shims so as to avoid that the valve shim pops out when the speed is higher and the serious damage to engine is caused. **Do not attempt to reduce the thickness of valve shim so as not to break the valve shim and cause serious damage to engine.**

●Apply oil to the surface of valve lifter and then install the lifter.

●Install the camshaft (see "Installing Camshaft" in "Engine Cylinder Head and Cylinder Head Cover" chapter).

●Check the valve clearance again and carry out adjustment again if necessary.

●Install the parts removed previously (see the corresponding chapters).

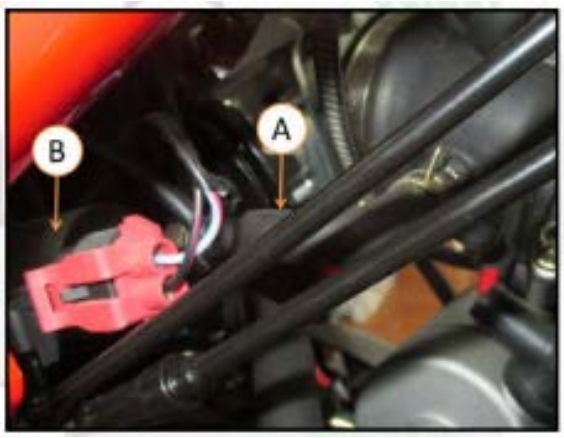
Check Whether Air Inlet Device is Damaged

●Pull the connecting pipe [A] between the carbon canister solenoid valve and engine inlet out from the carbon canister solenoid valve [B].

●Start the engine and make it idle.

●Hold the end of connecting pipe between carbon canister solenoid valve and engine inlet with fingers and feel the negative pressure pulse in the hose.

★If no negative pressure pulse can be felt, check whether air leakage occurs in the air inlet device.



Clutch

Check Whether Clutch Control System is Normal

●Start the engine to ensure that the clutch cannot slip and can be separated normally.

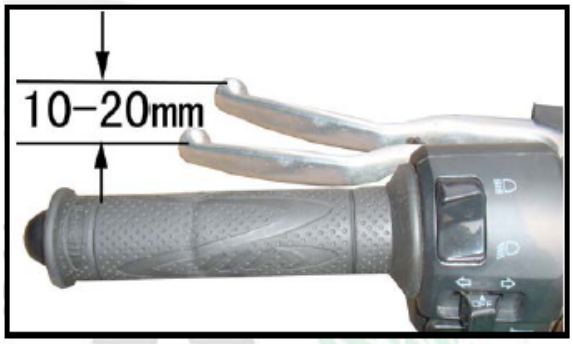
★If the clutch is abnormal, check the clutch system.

⚠Warning

If the motorcycle needs to be run in the checking process, ensure to run it at the place where the traffic conditions are normal.

Check Free Play of Clutch Handle

Standard: 10-20mm.



★If the free play is inaccurate, please adjust the clutch wire.

●Check whether the clutch lever can move smoothly from fully loosened to clenched and whether the return spring can make the clutch close quickly and completely at any steering position.

★If the clutch lever cannot be reset normally, check whether the winding method of clutch wire, free play of handle and cable are damaged. Then add lubricant to the clutch wire.

●Turn the handle to the right and left to ensure that there is no change in clutch operation and the gear can be put smoothly.

★If the gear cannot be put smoothly, check the free play and winding method of clutch wire.

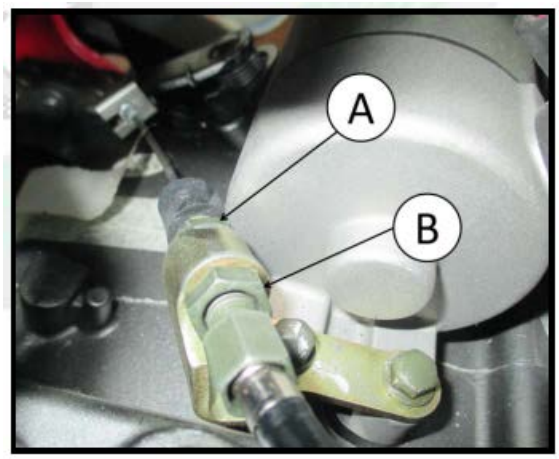
★If necessary, adjust the throttle cable [A] according to the following steps:

(1) Unscrew the fastening nut [1].

(2) Tighten or unscrew the adjustment device [2] until the free play of clutch handle meets the specified value 10-20mm.

(3) Tighten the fastening nut [1] in the end.

★If the requirements of free play cannot be met after the handle end of clutch cable is adjusted to the limiting position, carry out adjustment through the locknut [A] and adjusting nut [B] at the clutch cable and engine ends.



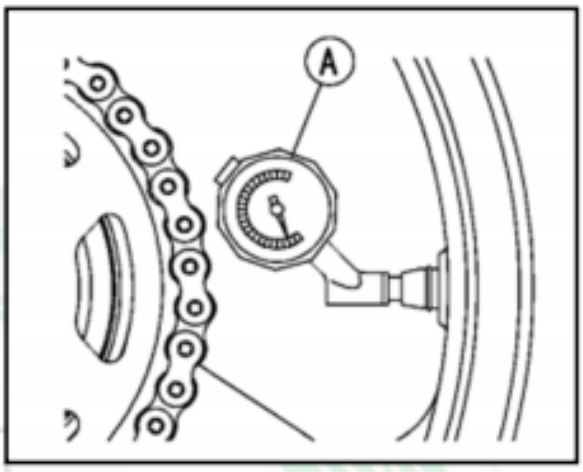
(1) Unscrew the fastening nut [A].

(2) Tighten or unscrew the adjustment nut [B] until the free play of clutch handle meets the specified value 10-15mm.

(3) Tighten the fastening nut [A] in the end.

Wheel/Tire

Checking Tire Pressure



●Remove the valve cap.

●Measure the tire pressure with an air pressure gauge [A] when the tire is cooled (i.e., the travelled mileage of motorcycle within 3 hours before the measurement does not exceed 2 km).

●Install the valve cap back.

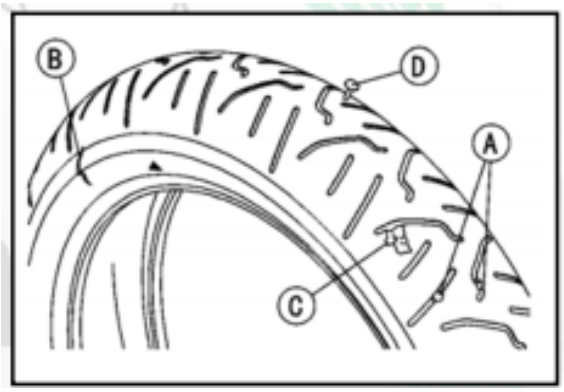
★If necessary, adjust the tire pressure according to the relevant specifications.

Pressure (when the tire is cooled)

Front wheel: 220±10kPa

Rear wheel: 250±10kPa

Checking Whether Rim/Tire is Broken



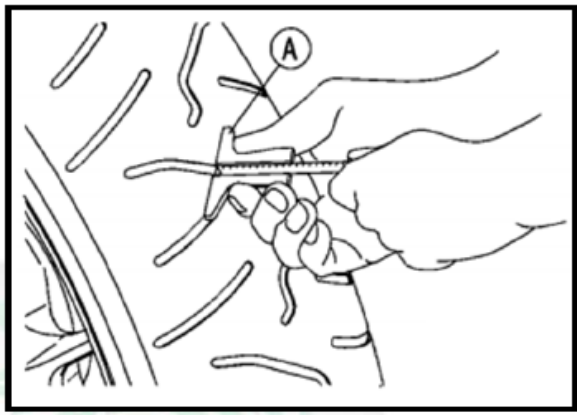
●Clear the stones [A] or other foreign materials embedded on the thread.

●Visually check whether there are crack [B], notch [C] and nail [D] on the tire [B] and replace the tire if necessary. If the tire expands or protrudes, the inside is damaged and the tire needs to be replaced.

●Visually check whether there are crack, notch and dent on the rim.

★If any damage is found, replace the rim according to the situations.

Checking Wear Situations of Thread



As the tread wear is more and more serious, it is more likely to cause tire blowout. It is estimated that 90% of tires will be damaged in the last 10% of service life of tire (90% wear). If the tire is used until it is grinded smoothly, the money cannot be saved and safety issues may be caused.

●Measure the tread depth in the middle of the tread with a depth meter [A]. As the tire is worn unevenly, the measurement shall be carried out in different parts.

★If any value measured are below the service limit, the tire must be replaced (see “Disassembling/ Installing Tire” in the “Wheel/Tire” chapter).

Thread depth

Standard:

Front wheel: 3.8 mm

Rear wheel: 4.8 mm

Service limit:

Front wheel: 1.6 mm

Rear wheel: 2.0 mm

⚠Warning
In order to ensure the safety and stability of tire, it is necessary to replace the current tire with the recommended standard tire and inflate the tire according to the standard air pressure.

Remark
○*The minimum thread depth is specified in most countries: please make sure to comply with that!*
○*Check the wheel and balance it after the tire is replaced.*

Checking Whether Wheel Bearing is Damaged

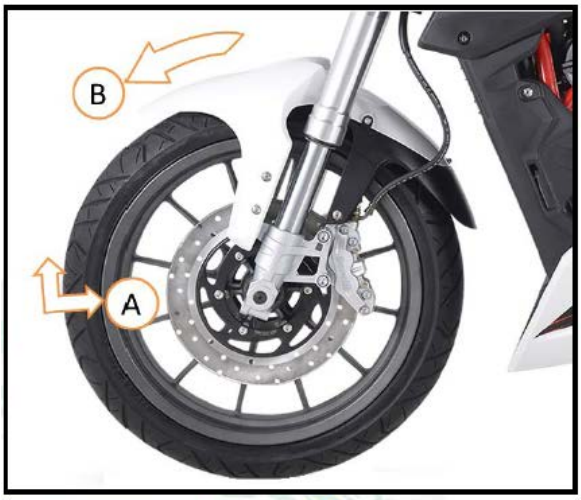
●Use the jack to lift the front wheel up from the floor (see "Disassembling/ Installing Tire" in the "Wheel/Tire" chapter).

●Rotate the handle to the rightmost or leftmost side.

●Shake the wheel frame to both sides [A] with both hands to check whether there is axial clearance in the front wheel bearing.

●Rotate the front wheel [B] gently to see whether the wheel can be rotated smoothly, whether it is difficult to rotate or whether there is unusual resistance or noise.

★If it is found that the wheel is difficult to rotate and there is resistance or noise, remove the front wheel and check the wheel bearing (see "Disassembling Front Wheel and Checking Hub Bearing" in the "Wheel/Tire" chapter).

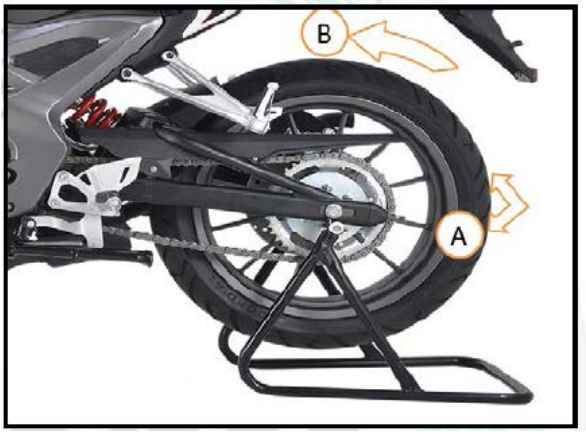


●Lift the rear wheel up from the ground with brackets (see "Disassembling Rear Wheel" in "Wheel/Tire" chapter).

●Shake the wheel frame to both sides [A] with both hands to check whether there is axial clearance in the rear wheel bearing.

●Rotate the rear wheel [B] gently to see whether the wheel can be rotated smoothly, whether it is difficult to rotate or whether there is unusual resistance or noise.

★If it is found that the wheel is difficult to rotate and there is resistance or noise, remove the rear wheel and check the wheel bearing (see "Disassembling Rear Wheel and Checking Hub Bearing" in the "Wheel/Tire" chapter) and axle sleeve (see "Checking Axle Sleeve and Bearing" in "Final Drive Mechanism" chapter).



Final Drive Mechanism

Checking Lubrication State of Drive Chain

●If there is no special lubricant, the priority can be given to the heavy oil (e.g.: SAE 90), not light oil, because the heavy oil can be attached to the drive chain for longer time with better lubrication effect.

●If the drive chain looks dirty, it must be cleaned before adding the lubricant.

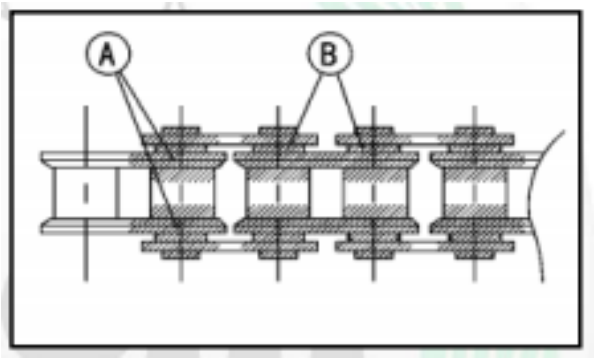
Note
The lubricant of oil seal is sealed between the side plate and roller. Therefore, in order to avoid damaging the O-ring seal and cause the lubricant reduction, please comply with the following rules: **The O-ring seal of drive chain must be cleaned with kerosene or diesel oil. If other cleaning solvents (such as gasoline or trichloro ethylene) are used, the O-ring seal will be corroded and expanded. After the cleaning is completed, dry the drive chain with compressed air immediately. Ensure to clean and dry the drive chain within 10 minutes.**

●Apply the lubricant to both sides of chain roller to make it penetrate into the chain roller and sleeve. Add the lubricant to the O-ring seal to make the lubricant cover the surface of O-ring seal.

●Wipe off the redundant lubricant.

Part where lubricant is added: [A]

O-ring seal: [B]



Checking Whether Drive Chain is Loose

Note
○Support the motorcycle with a side stand to check whether the drive chain is loose; or support the motorcycle with a bracket to check whether the drive chain is loose. ○If there are stains on the drive chain, clean the drive chain and then add lubricant after it is dry.

●Checking the wheel alignment (see “Checking Wheel Alignment”).

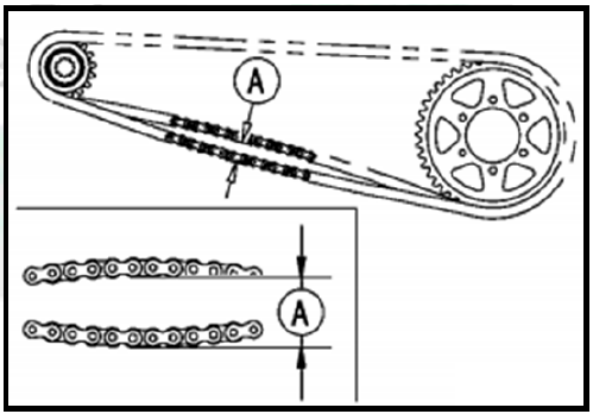
●Rotate the rear wheel to find the position where the drive chain is tightest.

●Measure the up and down swing (slackness of drive chain) [A] of chains between front and rear sprockets.

★If the slackness of drive chain exceeds the standard, please adjust it!

Slackness of Drive Chain

Standard: 10-15mm



Adjusting Slackness of Drive Chain

●Lift the rear wheel up from the ground with a bracket (see “Disassembling Rear Wheel” in the “Wheel/Tire” chapter).

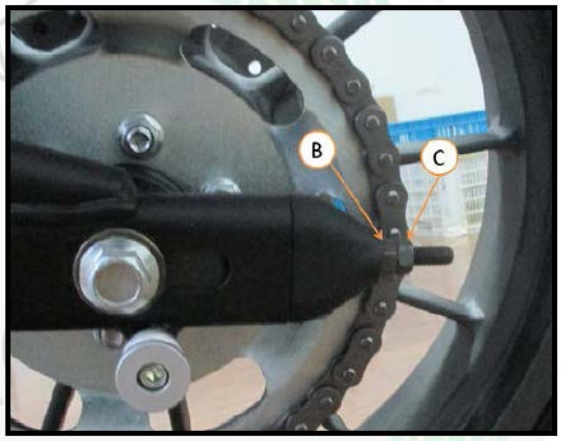
●Unscrew the rear wheel axle nut [A].

●Screw off the locknuts [C] of two chain adjusters on the left and right.

●Evenly rotate the adjusting nuts [B] of two chain adjusters on the left and right until the slackness of drive chain is appropriate. To align the drive chain with the wheel, the notch on the right wheel alignment indicator shall correspond to the swing arm sign or position which is aligned with the left wheel alignment indicator notch.

★If the drive chain is too loose, adjust the chain adjusters on the right and left counterclockwise from the rear view of motorcycle and make them balanced on the left and right sides.

★If the drive chain is too tight, adjust the chain adjusters on the right and left clockwise from the rear view of motorcycle, make them balanced on the left and right sides, and then kick the wheel forward.



Screw up	Slackness is increased
Screw off	Slackness is reduced

⚠Warning

If the wheels are not aligned, the wheels will be worn out abnormally and there may be dangers during riding.

●Make sure to tighten the locknuts [C] of two chain adjusters on the left and right.

●Tighten the wheel axle nut.

Tightening torque of rear wheel axle nut: 150N·m

●Rotate the wheel, measure the slackness of drive chain at the tightest position of drive chain and adjust it again if necessary.

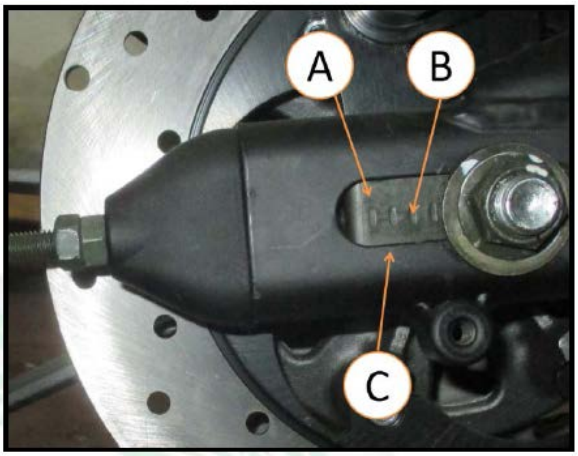
⚠Warning

If the rear wheel axle nut is not tightened, there may be dangers during riding.

Checking Wheel Alignment

●Check whether the position of the concave scale line [B] on the right chain adjuster [A] on the rear swing arm [C] is the same as that of concave scale line on the left chain adjuster.

★If they are not aligned, adjust the slackness of drive chain and align the wheel alignment (see “Adjusting Slackness of Drive Chain”).



Remark
○**Check whether the wheel alignment is accurate with the ruler or rope.**

⚠Warning
If the wheels are not aligned, the wheels will be worn out abnormally and there may be dangers during riding.

Checking Wear of Drive Chain

●Remove the chain guard (see “Disassembling Drive Chain” in “Final Drive Mechanism” chapter).

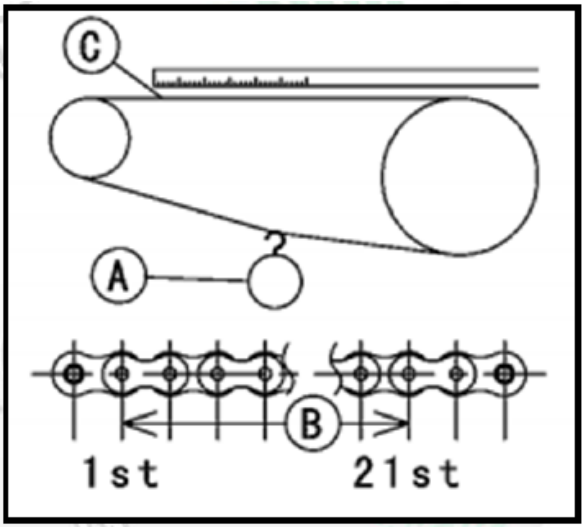
●Rotate the rear wheel and check whether there are damaged rollers, loose cotter pins and chain meshes.

★If any abnormal situation is found, replace the drive chain.

★If the drive chain looks dry, add the lubricant.

●Hang a 10 kg weight on the drive chain to tighten the drive chain.

●Measure the length of the 20 links [B] (from the center of the first cotter pin to the center of the 21st cotter pin) of the drive chain of the straight part [C]. As the drive chain is worn unevenly, the measurement shall be carried out in several different parts.



★If any measured value exceeds the service limit, the drive chain needs to be replaced. Replace the front and rear sprockets simultaneously.

Length of 20 chain meshes of drive chain

Standard: 317.5-318.2 mm

Service limit: 323 mm

⚠Warning
If the wear of drive chain exceeds the service limit, the drive chain must be replaced, otherwise there may be dangers during riding. If the drive chain is broken or falls off from the sprocket, the sprocket of engine will be tripped or the rear wheel will be locked, which will cause serious damage to the motorcycle and make it be out of control. **To ensure safety, the standard drive chain must be used. The standard drive chain is a chain without meshes which cannot be cut off during installation.**

Standard Drive Chain

Model: 520HO

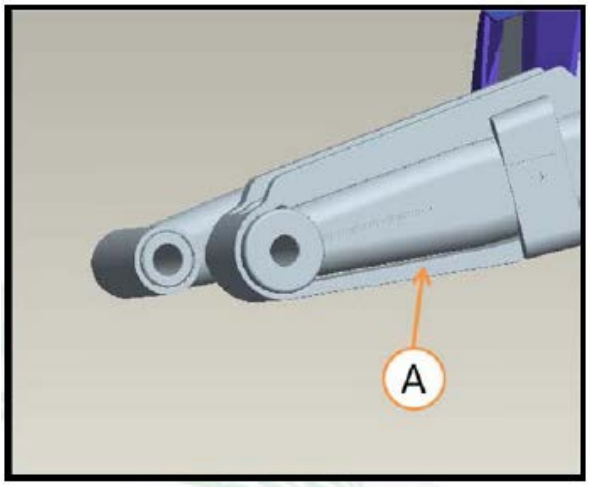
Number of chain meshes: 118

Checking Wear of Chain Guide

●Remove the rear swing arm (see “Disassembling Rear Swing Arm” in “Suspension System”).

●Visually checking the chain guide [A].

★If there is abnormal wear or damage in the chain guide, it must be replaced.



Brake

Check Whether Brake Hose and Brake Pipe are Damaged and Their Installation States

●For the motorcycle models which are equipped with ABS, there are the following precautions:

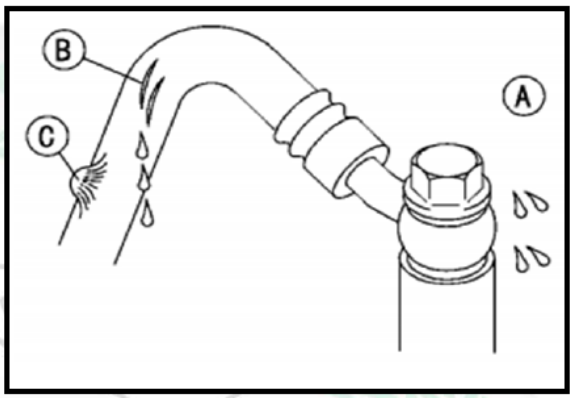
●Removing:

Fuel tank (see “Disassembling Fuel Tank” in “Fuel Injection System (EFI)”) and battery (see “Disassembling Battery” in “Electrical System”).

●Check whether the brake hose, brake pipe and accessories are corroded and whether there are cracks or leaks.

○If the brake hose and brake pipe are not properly maintained, the high pressure inside the brake pipe will cause the leakage of brake fluid [A] or rupture of brake hose and brake forming pipe. When checking the rubber hose, the pipe needs to be bent and twisted.

★If it is found that there is any crack [B], expansion [C] or leakage on the brake hose or brake forming pipe, it must be replaced.



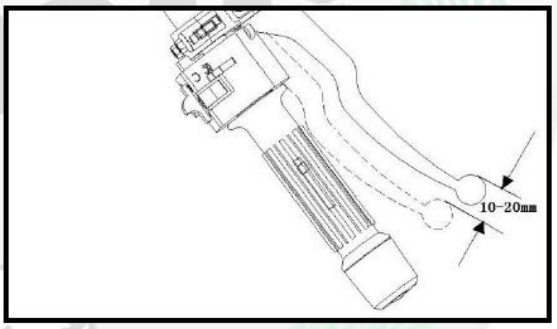
●Tighten all the banjo bolts of brake hose.

Tightening torque of banjo bolt of brake hose: 25 N·m

Tightening torque of connecting nut of brake hose: 18 N·m

●Check the winding method of brake hose.

★If the winding methods of brake hose and brake pipe are incorrect, arrange the brake hose and brake pipe according to the section in the “Accessory” chapter: “Winding Method of Cable, Wire and Hose”.



Free Play of Front Brake

●Measure the free play at the top end of front brake handle

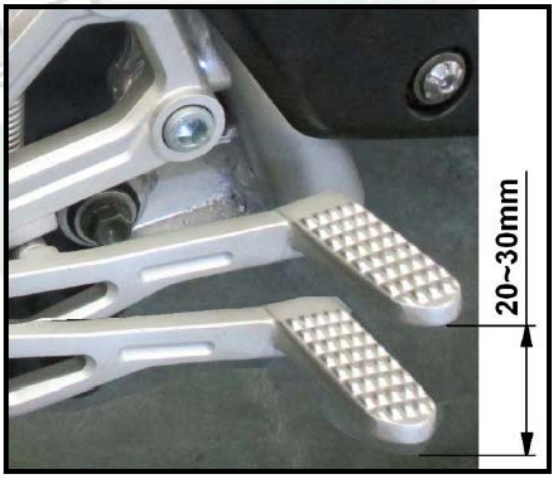
Free play of front brake handle.

Free play: 10-20mm

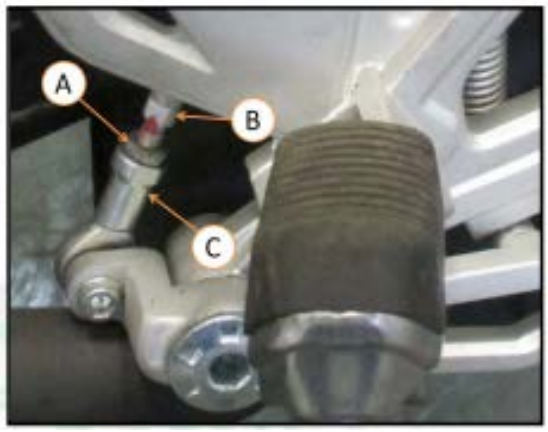
Free Play of Rear Brake

●Measure the free play of brake pedal.

Free play: 20-30mm.



★If the measured value does not meet the specified valve, the adjustment shall be carried out.



○**Adjust the free play of brake pedal.**

1. Loosen the nut A above the connecting rod C.
2. Screw up or screw off the brake push rod B to adjust the free play of brake pedal.

   If the brake push rod B is tightened, the free play will be reduced;

   If the brake push rod B is unscrewed, the free play will be increased.
3. When the free play meets the specified value, tighten and fasten the nut A.
4. After adjustment, the brake dragging phenomenon shall not occur.

Checking Brake

●Ride the motorcycle on the dry road and check whether the front and rear brakes are normal.

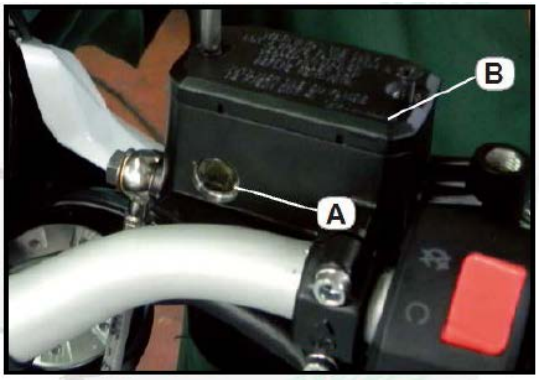
★If the brake is abnormal, check the brake system.

⚠Warning
If you need to test the motorcycle in the checking process, make sure to ride it in the place with safe traffic conditions.

Checking Brake Fluid Level

●Check whether the level of front brake fluid and brake fluid in the reservoir [B] exceeds the lower limit oil lens [A].

Remark
○**When checking the brake fluid level, rotate the handle to keep the front brake reservoir horizontal.**



★If the level is lower than the lower limit, add the brake fluid in the **front brake reservoir** until the level reaches the high fluid level line [A].

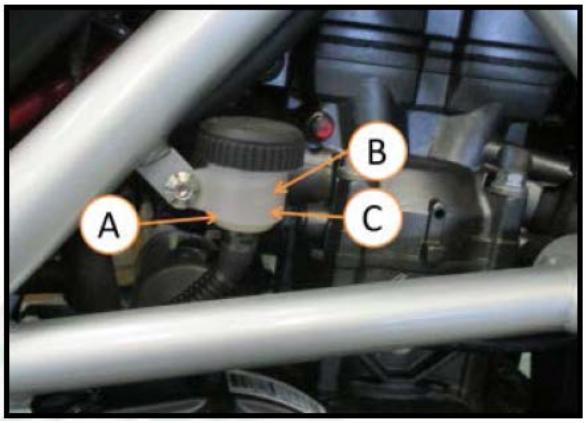
Remark
○Brake fluid can damage the painted surfaces or plastic parts. Therefore, wrap the absorbent paper around the pump and clear the spilled brake fluid immediately.

●Check the brake fluid cylinder diaphragm on the cover. If there is any damage/wear, please replace the brake fluid cylinder diaphragm

●Check whether the level of the brake fluid in the rear brake fluid cup [A] is between the upper limit [B] and the lower limit [C].

★If the level is below the lower limit, add the brake fluid to the cup until the level reaches the high fluid level line [C].

●Check the brake fluid diaphragm on the cup. If there is any damage/wear, please replace the brake fluid diaphragm



⚠Warning

If the brake fluid needs to be added, but the type and brand of brake fluid in the brake fluid cup cannot be confirmed, all the brake fluid in the brake fluid pipe must be replaced. After replacing the brake fluid, only use the brake fluid of the same type and brand.

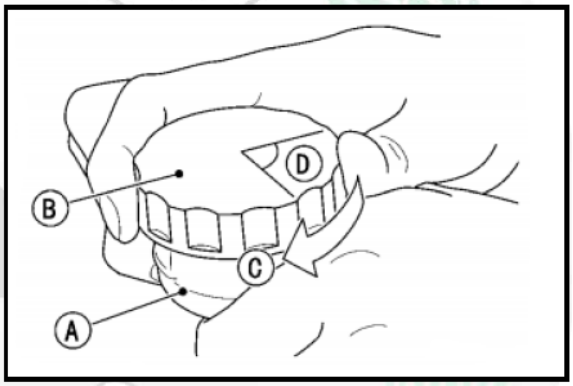
When adding the brake fluid, be careful not to allow coolant to enter the cup. Coolant will significantly reduce the boiling point of the brake fluid and the steam bubbles will produce when heated, which will make the performance of braking system reduce.

Recommended Disc Brake

Grade: DOT4

●Install the cap of rear brake fluid cup correctly according to the following procedures.

○Tighten the cap [B] of rear brake fluid cup with hands clockwise [C] first until a slight resistance is felt, which indicates that the cap has been fixed to the cup, then hold the cup [A] and rotate another 1/6 turn [D].

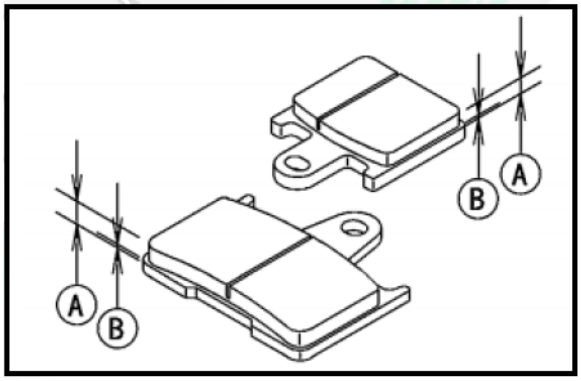


Checking Wear of Brake Pad

●Remove the brake pad (see "Disassembling Front Wheel/Rear Wheel Brake Pad" in "Brake" Chapter).

●Check the friction plate thickness [A] of the brake pad inside the calipers.

★If the friction plate thickness of any brake pad is lower than the service limit [B], replace the two brake pads inside the calipers simultaneously.



Friction Plate Thickness of Brake Pad

Standard:

Front wheel brake pad: 4.0 mm

Rear wheel brake pad: 5.0 mm

Service limit: 1 mm

Checking Brake Lamp Switch

●Turn on the main switch..

●After the brake handle is applied for 20mm or the brake pedal is depressed for about 25mm, the brake lamp shall be on.

★If the brake lamp is not on, check or replace the following parts:

Battery (see “Checking Charging Situation” in “Electrical System”);

Brake lamp (see “Disassembling Tail Lamp/Brake Lamp” in “Electrical System” chapter);

30A main fuse and 10A tail lamp fuse (see “Checking Fuse” in “Electrical System” chapter);

Front brake lamp switch [A] (see “Checking Switch” in “Electrical System” chapter);

Rear brake lamp switch [A] (see “Checking Switch” in “Electrical System” chapter);

Wire harness (see “Checking Circuit” in “Electrical System” chapter)

Suspension System

Checking Front /Rear Shock Absorber

●Shake the front fork up and down for four or five times to check whether the travel of shock absorber is smooth.

★If the front fork cannot be moved smoothly or there is noise, check the oil level or fork clamp of front shock absorber oil (see “Replacing Front Shock Absorber Oil” in “Suspension System” chapter).

●Shake the seat up and down for four or five times to check whether the travel of shock absorber is smooth.

★If the travel of shock absorber is not smooth or there is noise, check for the shock absorber oil leakage (see “Checking for Rear Shock Absorber Oil Leakage”).

Check for Front Shock Absorber Oil Leakage

●Visually check for the front shock absorber [A] oil leakage.

★If necessary, replace or maintain any part with defects.

Check for Rear Shock Absorber Oil Leakage

●Visually check for rear shock absorber [A] oil leakage.

★If oil leakage is found, replace the shock absorber.

Steering System

Checking Steering Clearance

●Lift the front wheel up from the ground with a jack.

Special Tool—Jack:

●When the front wheel faces ahead straightly and the front wheel is off the ground, the whole handle shall be able to slide freely to the left and right steering upper limits by the gravity action after the left or right handle is pushed slightly.

★If the whole handle cannot slide freely to the left and right steering upper limits, it indicates that the steering system is too tight.

●Push and pull the front fork to feel whether there is an excessive clearance in the steering system.

★If you feel that the clearance is too loose, it indicates that the steering system is too loose.

Remark
○*The connection of cable and wire must be considered, because they may also affect the movement of front fork.*
○*Make sure that the winding method of lead and cable is correct.*
○*The state of bearing must be good and the lubricant shall have been added to the bearing, otherwise the detection result is invalid.*

Adjusting Tightness of Steering Seat

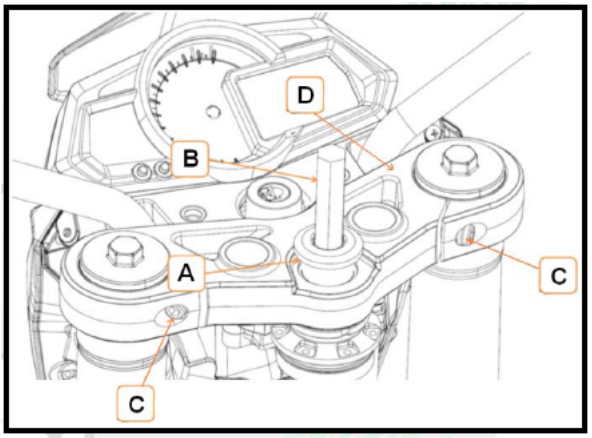
●Removing:

Handlebar (see “Disassembling Handlebar” in “Steering Gear” chapter);

Disassemble the steering stem head bolt [A] with a hexagon spanner [B];

Loosen the fastening bolt [C] of upper bridge [D] (Loosen)

Remove the upper bridge [D]



●Remove the steering stem locknut [E].

Special tool—steering stem nut wrench: four jaws

●Adjust the steering stem gland nut [F].

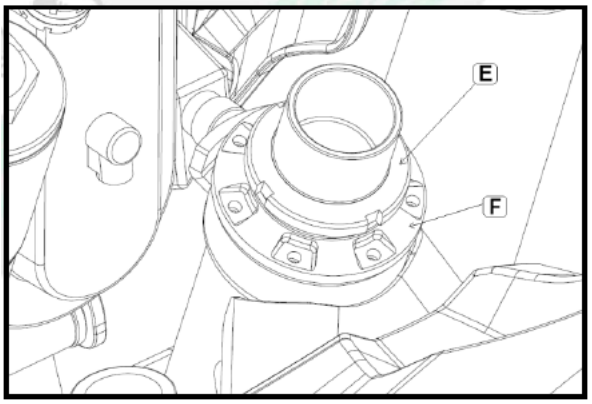
★Tighten the steering stem gland nut [F] to the torque of 30-35N·m

Special tool—steering stem nut wrench: seven jaws

★Rotate the steering stem left and right for twice to three times; it cannot be stuck and the bearing race cannot be loose during rotating;

★Unscrew the gland nut [E] for 1/4 circle, then tighten it and use the relevant wrench to fasten the gland nut [F];

★Tighten the steering stem gland nut [F] to the torque of 20-24N·m



●Install the steering stem locknut [E].

Special tool—steering stem nut wrench: four jaws

★Fasten the locknut [E] to the torque below: 60N·m

⚠Warning:
Do not fasten the locknut [E] excessively

●Check the tightness of steering seat:

★Make sure that the support is not loose and rotate the front fork left and right to the end of travel to ensure that there is no block point. If there is any block point, remove the lower bracket components and check the upper and lower steering bearings.

●Install the upper bridge.

●Install the steering stem head.

●Install the steering stem head bolt.

●Install the handlebar.

●Tightening:

Tightening torque of steering stem head nut: 78 N·m

Tightening torque of upper bridge fastening bolt (C): 30 N·m

Tightening torque of handlebar fastening bolt (C): 20 N·m

●Check the steering gear again.

★If the steering gear is still too tight or loose, readjust it.

●Install the handlebar (see "Installing Handlebar" in the "Steering Gear" chapter).

Adding Lubricant to Steering Stem Bearing

●Remove the steering stem (see "Disassembling Steering Stem and Steering Stem Bearing" in the "Steering Gear" chapter).

●Clean the ball bearings in the upper and lower retaining ring with the solvent with a high flash point and wipe up the upper and lower outer races. The outer race is pressed into the first section of steering stem. Clear the grease and dust.

●Visually check the outer races and ball bearings.

★If the bearing components have been worn or damaged, they must be replaced.

●Wrap the upper and lower ball bearings [A] inside the retaining ring with grease and then apply a thin layer of grease to the upper and lower outer races.

●Install the steering stem (see "Installing Steering Stem and Steering Stem Bearing" in the "Steering Gear" chapter).

●Adjust the steering gear (see "Adjusting Free Steering Clearance").

Electrical System

Checking Lamp and Switch

Step 1

●Turn on the main switch.

●All motorcycle lamps will be on according to the order shown in the table below.

Position lamp [A]	On
Position lamp (a1-1) (LED) [A]	On
Tail lamp (LED) [B]	On
License plate lamp [C]	On
Tachometer lamp (LED) [D]	On
Liquid crystal meter panel (LCD) [E]	On
Neutral indicator (LED) [F]	On
Fault alarm indicator (LED) [G]	On
ABS indicator (LED) [H] (models with ABS)	On

★If the lamps are not on, check or replace the following parts:

Battery (see “Checking Charging Situation” in the “Electrical System” chapter);

30A main fuse and 10 A tail lamp fuse (see “Checking Fuse” in the “Electrical System” chapter);

Applicable bulb (see “Wiring Diagram” in the “Electrical System” chapter);

Header parts of meter panel LCD (see “Checking Header Parts” in the “Electrical System” chapter);

Header parts of neutral indicator (LED) (see “Checking Header Parts” in the “Electrical System” chapter);

Header parts of alarm indicator (LED) (see “Checking Header Parts” in the “Electrical System” chapter);

Header parts of fault alarm indicator (LED) (see “Checking Header Parts” in the “Electrical System” chapter);

Header parts of lamp (LED) (see “Checking Header Parts” in the “Electrical System” chapter);

ECU (see “Checking ECU Power” in the “Fuel Injection System (EFI)” chapter);

Main switch (see “Checking Switch” in the “Electrical System” chapter);

Gear position switch (see “Checking Gear Position Switch” in the “Electrical System” chapter);

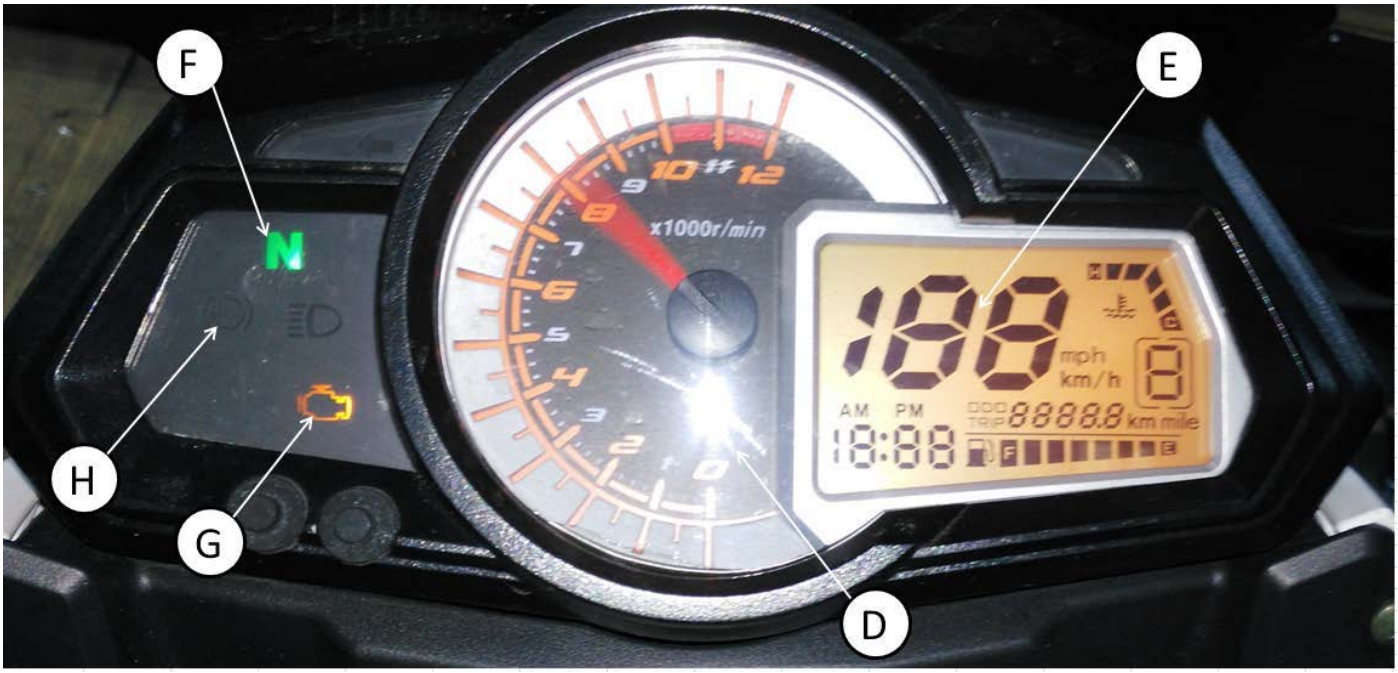
Wire harness (see “Checking Circuit” in the “Electrical System” chapter).

ABS indicator (LED) (models with ABS) [see “Checking ABS Indicator (LED)” in the “Brake” chapter”)

●Turn off the Main switch.

●At this time, all lamps shall be off.

★If any lamp is not off, replace the Main switch.



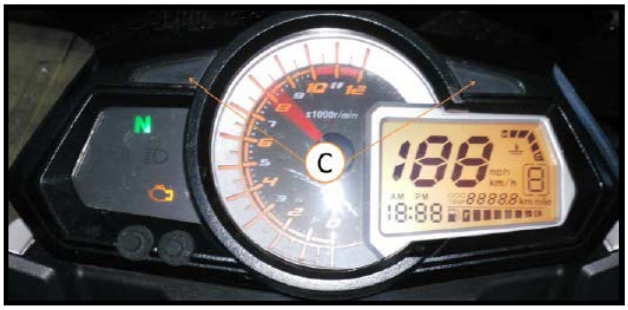
Step 2

●Turn on the Main switch.

●Turn on the turn signal switch [A] (left or right).

●Left turn signal or right turn signal (LED) (position of corresponding switch) (front and rear) will flash.

●Left/right turning indicator (LED) [B] in the meter panel will flash.



★If the left turn signal or right turn signal is not on, check or replace the following parts:

Turn signal (LED) (see “Replacing Turn Signal” in the “Electrical System” chapter);

Header parts of turning indicator (LED) (see “Checking Header Parts” in the “Electrical System” chapter);

Turn signal switch (see “Checking Switch” in the “Electrical System chapter);

Wire harness (see “Checking Circuit” in the “Electrical System” chapter).

●Push the turn signal switch back.

●The turn signal and turning indicator (LED) shall be off.

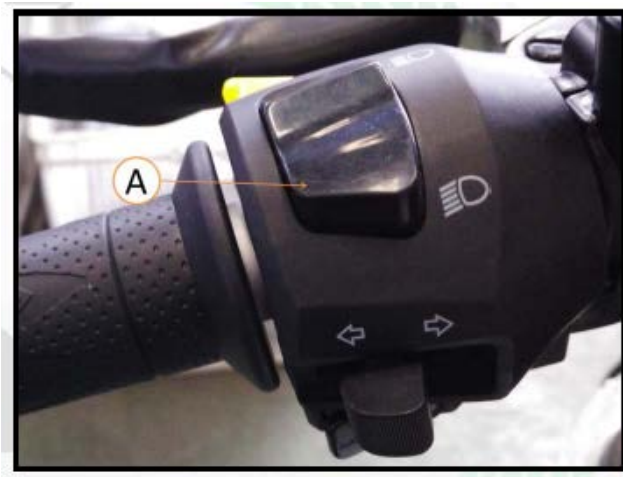
★If the lamps do not off, check or replace the following parts:

Turn signal switch (see “Checking Switch” in the “Electrical System” chapter);

Step 3

●Turn the dimmer switch [A] to the position of low beam [A].

●Start the engine.



●Low beam head lamp [B] shall be on.

★If the low beam head lamp is not on, check or replace the following parts:

Head lamp low beam bulb (see “Replacing Head Lamp Bulb” in the “Electrical System” chapter);

15A fuse of head lamp (low beam) (see “Checking Fuse” in the “Electrical System” chapter);

10A fuse of head lamp relay (see “Checking Fuse” in the “Electrical System” chapter);

Head lamp circuit relay in the relay box (see “Checking Relay Circuit” in the “Electrical System” chapter);

Head lamp relay (low beam) (see “Checking Head Lamp Relay” in the “Electrical System” chapter);

Wire harness (see “Checking Circuit” in the “Electrical System” chapter).

●Press the passing lamp switch [D] (models with passing lamp switches) or turn the dimmer switch to the position of high beam [A].

●The low beam head lamp [A] and high beam head lamp [B] shall be on.

●The high beam indicator (LED) [C] shall be on.

★If the high beam head lamp and/or high beam indicator (LED) are/is not on, check or replace the following parts:

Head lamp high beam bulb (see “Replacing Head Lamp Bulb” in the “Electrical System” chapter);

15A fuse of head lamp (high beam) (see “Checking Fuse” in the “Electrical System” chapter);

10A fuse of head lamp relay (see “Checking Fuse” in the “Electrical System” chapter);

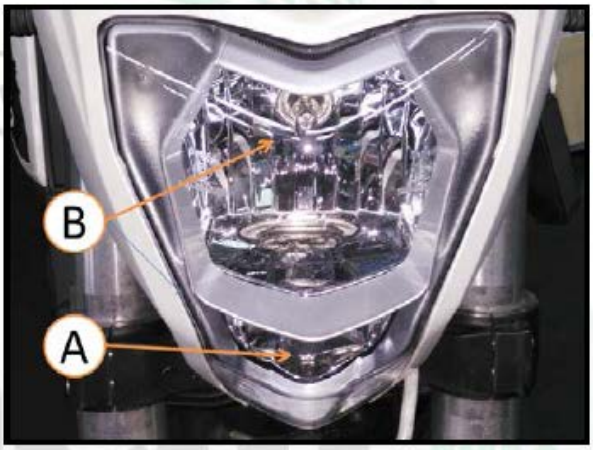
Passing lamp switch button (models with passing lamp switch button) (see “Checking Switch” in the “Electrical System” chapter);

Dimmer switch (see “Checking Switch” in the “Electrical System” chapter);

Head lamp circuit relay in the relay box (see “Checking Relay Circuit” in the “Electrical System” chapter);

Head lamp relay (high beam) (see “Checking Head Lamp Relay” in the “Electrical System” chapter);

Wire harness (see “Checking Circuit” in the “Electrical System” chapter).



●Turn off the engine stop switch.

●Low beam head lamp and high beam head lamp shall be still on.

★If the head lamp and high beam indicator (LED) are off, check or replace the following parts:

Head lamp circuit relay in the relay box (see “Checking Relay Circuit” in the “Electrical System” chapter).

●Turn off the main switch.

●The head lamp and high beam indicator (LED) shall be off

Checking Accuracy of Head Lamp

●Check the accuracy of head lamp beam.

★If the headlight beam lights up one side instead of straight front, adjust the beam.

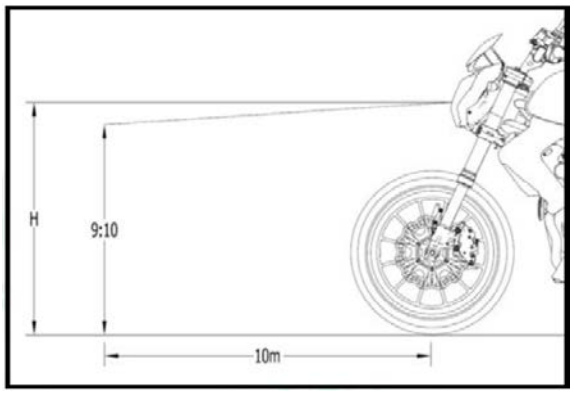
Adjust the beam of front head lamp correctly according to the following steps:

Park the motorcycle about 10 meters away from the upright wall on the completely flat ground. Fig. A

Ride the motorcycle and sit at the rider position.

Make sure that the highest point of beam is lower than 1/10 of horizontal axis of head lamp if the wall is lighted.

If the beam does not fall within these scopes, make some adjustment to maintain it at the correct position.

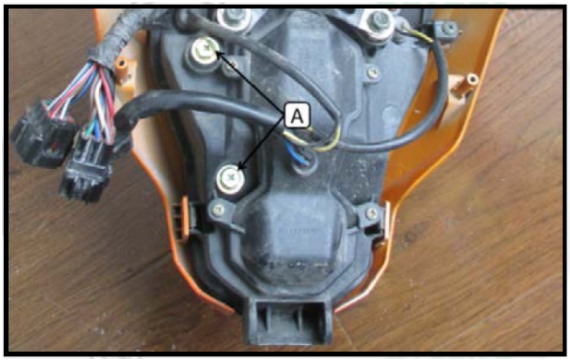


Adjustment of Head Lamp Beam

●Remove the inner cover (see “Disassembling Inner Cover” in the “Frame” chapter).

●Turn the adjusting screws [A] in two head lamps inward or outward until the beam lights up the front straightly.

★If the lighting position of head lamp beam is too low or too high, adjust the vertical beam.

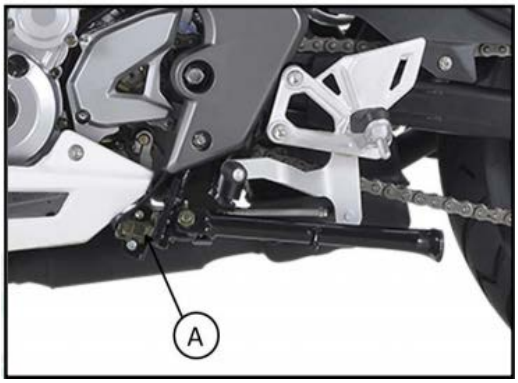


Rotating screw at the top left corner If the screw is rotated counterclockwise, the beam will be lowered If the screw is rotated clockwise, the beam will be risen Rotating screw at the top left corner If the screw is rotated counterclockwise, the beam will light up the left side If the screw is rotated clockwise, the beam will light up the right side

Remark
○*When the motorcycle is supported by its wheels and someone rides on the motorcycle, the brightest point shall be slightly lower than the horizontal line after opening the high beam. Adjust the angle of head lamp in accordance with the local regulations.*

Check Side Stand Switch

●Check the side stand switch [A] according to the table below.



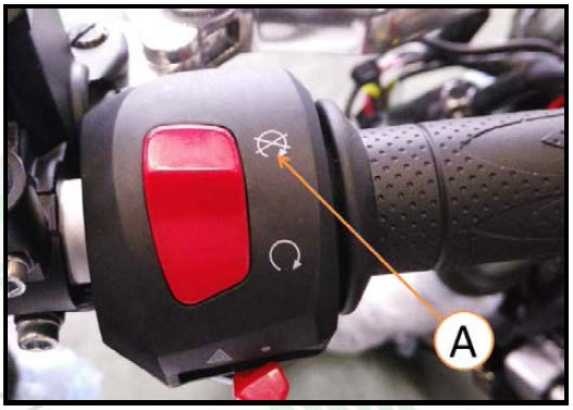
Side Stand Switch

Side stand	**Gear position**	**Clutch lever**	**Engine startup switch**	**Engine Run**
Up	Neutral	Release	Start	Continuous running
Up	Neutral	Tighten	Start	Continuous running
Up	1-6 Gear Position	Release	Not start	Continuous running
Up	1-6 Gear Position	Tighten	Start	Continuous running
Down	Neutral	Release	Start	Continuous running
Down	Neutral	Tighten	Start	Continuous running
Down	1-6 Gear Position	Release	Not start	Stop
Down	1-6 Gear Position	Tighten	Not start	Stop

★If the side stand switch is abnormal, please check or replace the following parts:
Battery (see “Checking Charging Situation” in the “Electrical System” chapter);
30A main fuse (see “Checking Fuse” in the “Electrical System” chapter);
30A ECU fuse (see “Checking Fuse” in the “Electrical System” chapter);
10A ignition fuse (see “Checking Fuse” in the “Electrical System” chapter);
Main switch (see “Checking Switch” in the “Electrical System” chapter);
Side stand switch (see “Checking Switch” in the “Electrical System” chapter);
Engine stop switch (see “Checking Switch” in the “Electrical System” chapter);
Startup switch button (see “Checking Switch” in the “Electrical System” chapter);
Gear position switch (see “Checking Gear Position Switch” in the “Electrical System” chapter);
Starter relay (see “Checking Starter Relay” in the “Electrical System” chapter);
Relay box (see “Checking Relay Circuit” in the “Electrical System” chapter);
Starter circuit relay (see “Checking Relay Circuit” in the “Electrical System” chapter);
Wire harness (see “Checking Circuit” in the “Electrical System” chapter).
★If the above parts are all normal, replace the ECU.

Checking Engine Stop Switch

Step 1



●Turn on the main switch.

●Set the gear as neutral.

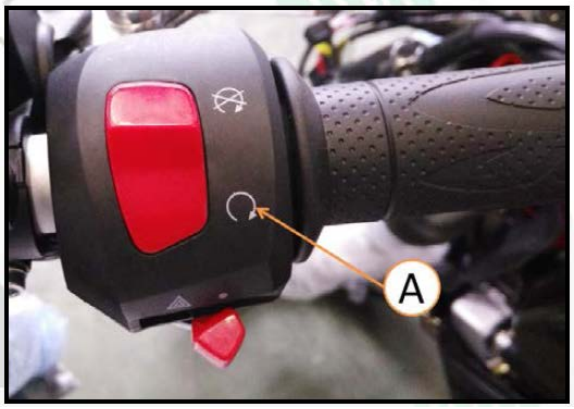
●Turn the engine stop switch to the stop position [A].

●Press the starter button.

●At this time, the engine shall have not started.

★If the engine has started, check or replace the following parts: Engine stop switch (see “Checking Switch” in the “Electrical System” chapter).

Step 2



●Turn on the main switch.

●Set the gear as neutral.

●Turn the engine stop switch to the power supply position [A].

●Press the starter button to start the engine.

●Turn the engine stop switch to the power-off position.

●The engine shall stop running immediately.

★If the engine does not stop, check or replace the following parts: Engine stop switch (see “Checking Switch” in the “Electrical System” chapter).

Others

Adding Lubricant to Frame Parts

●The rust must be removed with rust remover before any parts are lubricated and the grease, oil, stain or dirt shall be removed.

●Lubricate the following positions with the specified lubricant.

Remark
○*If the motorcycles are used in humid environment or on rainy days, especially when the motorcycles are sprayed and washed with high-pressure water, the relevant parts must be lubricated in accordance with the following specifications.*

Fulcrum shaft: lubricated with grease

Brake handle

Brake pedal

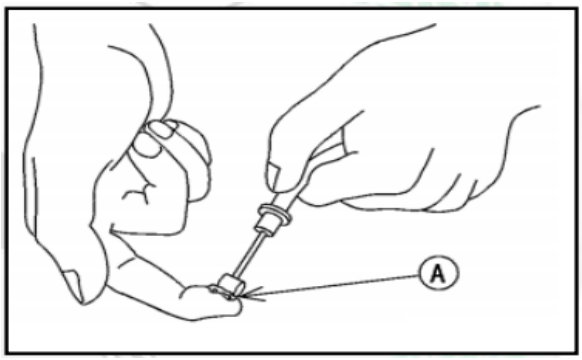
Clutch handle

Pump connecting pin on rear brake

Side stand

Thread: lubricated with grease

Throttle cable steel cable end [A]

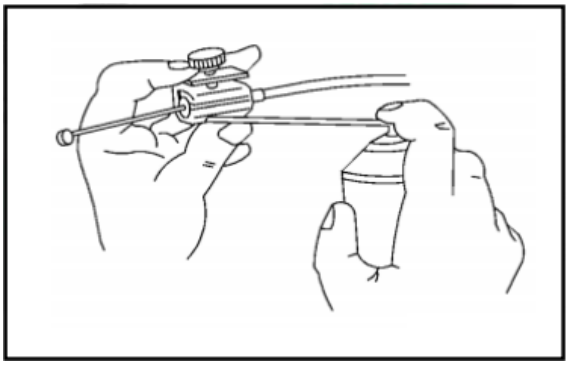


Cable: lubricated with rust inhibitor

Throttle cable steel cable

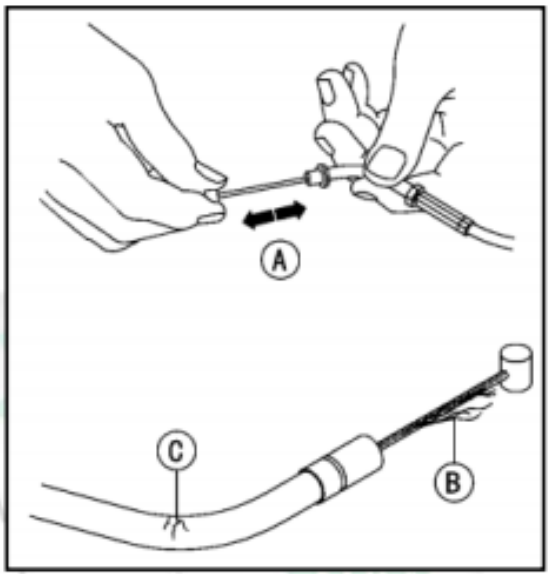
●Inject the rust inhibitor between cable and jacket to lubricate the cable.

○The sprinkling lubricant on the market can be bought and used for throttle cable steel cable.



●After the connection between two ends of throttle cable steel cable, the steel cable shall be able to move freely [A].

★If the steel cable cannot move smoothly after the lubricant is applied, the cable has been worn [B] or the throttle cable jacket is broken [C], the throttle cable must be replaced.



Check Tightness of Bolt, Nut and Fastener

●Check the tightness of the bolts and nuts listed below. In addition, check whether all the cotter pins are in place and in good condition.

Remark
○*The tightness of engine fasteners shall be checked when the engine is cooled (indoor temperature).*

★If the fasteners are loose, tighten them according to the specified tightening order and tightening torque. For the specifications on torque, see the corresponding chapters. Refer to the “Standard Torque Table” if the tightening torque is not described in the relevant chapters. When any fastener is tightened, tighten it for 1/2 circle and then continue to tighten it.

★If the cotter pin is broken, it must be replaced with a new one.

Bolts, Nuts and Fasteners to Be Checked

Engine:

Clutch lever fulcrum shaft bolt locknuts,
Engine mounting bolts and nuts,
Engine fixing bracket fastening bolts,
Engine fixing plate fastening bolts,
Exhaust pipe flange fastening bolts,
Muffler cavity fastening bolts,
Muffler cylinder mounting bolts
Shift rocker arm fastening bolts,

Wheel:

Front wheel axle,
Front wheel axle tightening bolts,
Rear wheel axle,
Rear wheel axle nuts,

Brake:

Brake handle fulcrum shaft bolt locknuts,
Brake pedal bolts,
Calipers mounting bolts,
Front brake master cylinder fastening bolts,
Rear brake master cylinder section head fastening bolts,
Rear brake master cylinder mounting bolts;

Suspension system:

Front shock absorber upper bracket tightening bolts,
Front shock absorber lower bracket tightening bolts,
Rear shock absorber upper bolts,
Rear shock absorber lower bolts,
Rear swing arm shafts,
Rear swing arm shaft nuts,

Steering gear:

Handlebar holder bolts,
Handle fixer fastening nuts
Steering stem head fastening bolts;

Others:

Foot rest bracket bolts
Side stand bolts

Replacement Part

Replacing Air Filter Element

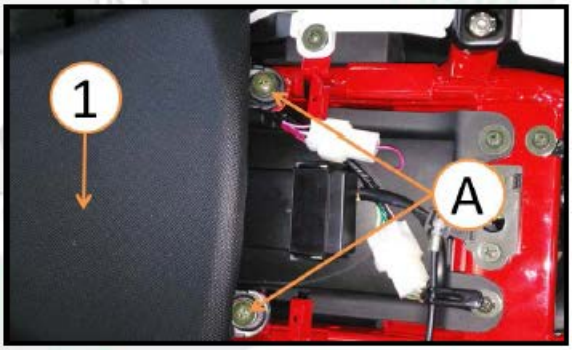
Remark
○*If the motorcycle is used in a dusty environment, the replacement interval of air filter element shall be shorter than the recommended replacement interval.* ○*After riding in rainy days or on muddy roads, replace the air filter element immediately.*

⚠Warning
If the dirt or dust enters into the throttle valve body assembly, the throttle may be blocked and safety accidents may be caused.

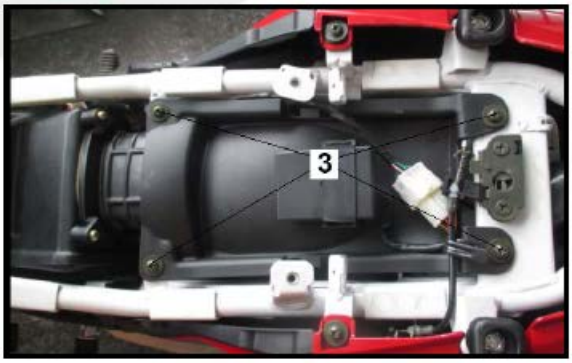
Note
If the dirt enters into the engine, the excessive wear of engine will be caused, or even the engine may be damaged.

●Remove the rear seat [2]

●Remove the fixing screw [A] and disassemble the front seat [1]

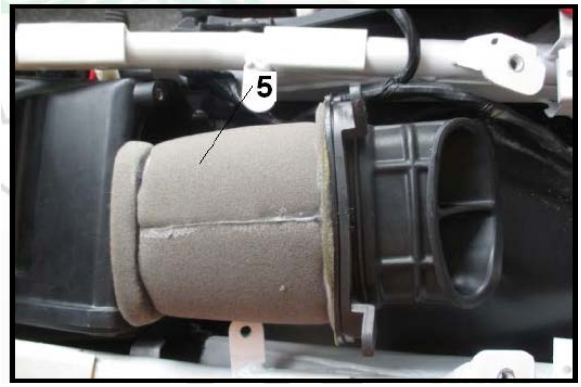


●Remove the tool box mounting bolt [3] and take the tool box.



●Removal:
Remove the fixing screw [4]
Remove the air filter air inlet

Take the air cleaner element [5].
★Checking:
Check whether the filter element is polluted or damaged.
Please replace with a new one if it has been polluted or damaged.
★Cleaning:
Rinse the filter element softly and thoroughly with cleaner.
Then apply the oil to the filter element and then squeeze out the redundant oil, so that the filter element is moist without oil dripping.



Remark
○*Do not use the gasoline so as not to cause fires.* ○*Do not distort or warp the filter element so as not to damage the foam materials.*

●Install a new filter element [5].

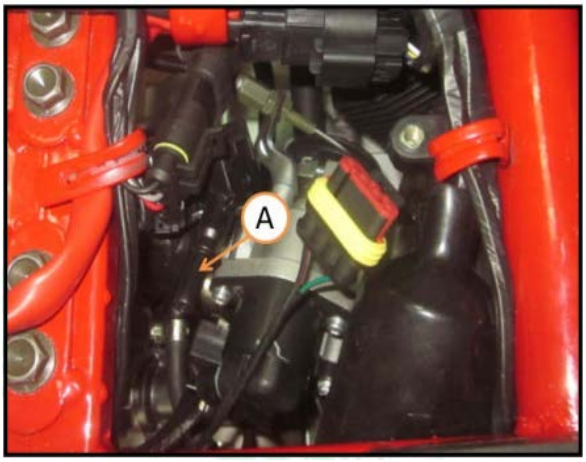
Note
The recommended air filter element (Benelli part number: 49202N220002) must be used. If other air filter elements are used, the engine will be worn prematurely or the performance of engine will be reduced.

●Carry out the installation and disassembly in a reverse process.
●Tightening:
Tightening torque of air filter air inlet screw: 5 N·m
Tightening torque of tool box bolt: 8 N·m
Tightening torque of rear seat cushion screw: 8 N·m
●Install the removed parts back.

Replacing Fuel hose

●Disassemble the fuel tank [see “Fuel Tank Disassembly” in the “Fuel Tank” chapter].

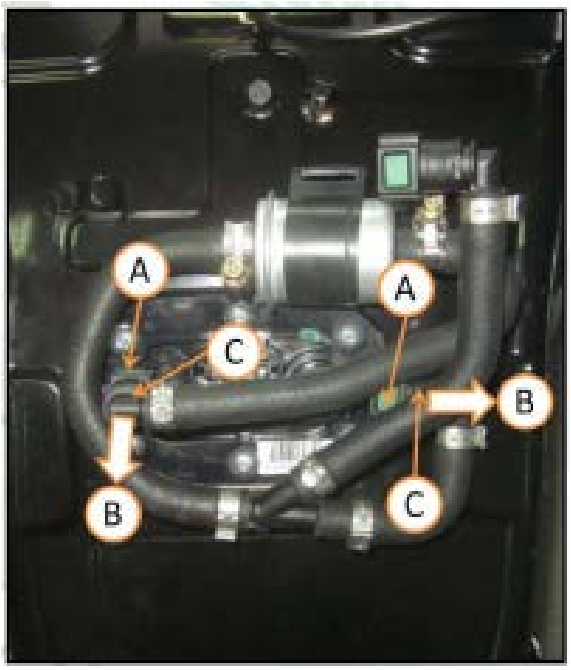
●Make sure to plug the hose joint [A] with a piece of cloth.



●Press the joint lock claws [A].

●Pull the joint [C] of [B] according to the direction shown in the figure.

●Remove the fuel hose components from the fuel tank.



⚠Warning

If any fuel spills, it must be cleaned thoroughly immediately.

When the fuel hose is disconnected, the fuel will spill from the fuel hose. Therefore, the hose joint shall be covered with a piece of clean workshop cloth to prevent fuel from spilling.

●When installing a new fuel hose, arrange the fuel hose correctly (see the section in the “Accessory” chapter: “Winding Method of Cable, Wire and Hose”).

●Plug the fuel hose joint directly into the pump fuel supply pipe until the clicks are generated by the hose joint.

●Push and pull the fuel hose joint back and forth for more than twice to ensure that it has been locked and cannot fall off.

⚠Warning

Make sure that the fuel hose joint is properly installed on the fuel supply pipe, otherwise the fuel will leak.

★If the fuel hose joint falls off, install it again.

●Start the engine and check whether the fuel hose leaks.

Replacing Coolant

⚠Warning

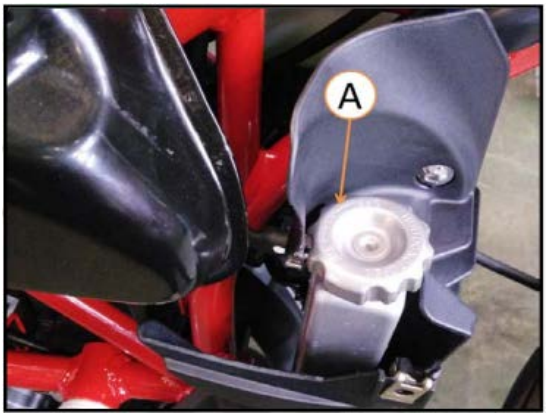
When the engine is still hot, do not remove the radiator cap or replace the coolant to avoid scalding. Carry out the above operation until the engine is cooled. If the coolant splashes on the tire, the tire slip will be caused, which may cause traffic accidents or personal injury. Therefore, once any coolant splashes on the frame, engine or other painted parts, immediately wipe up/clean up them.

Coolant is harmful to human body, so do not drink it!

●Removing:

Radiator cap [A]

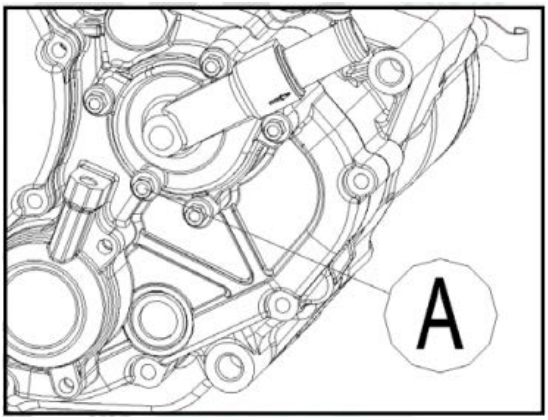
○Remove the radiator cap in two steps: turn the radiator cap counterclockwise to the first stop point, continue to turn it in the same direction, push it and then remove the cap.



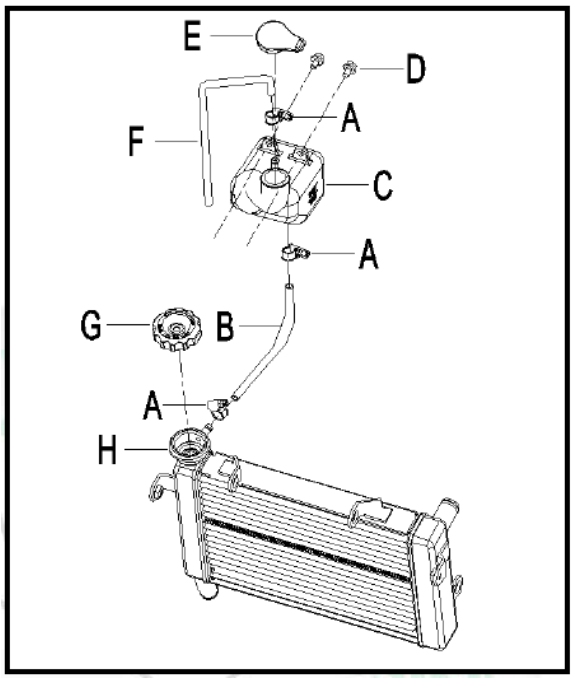
●Remove the fairing on the right side (see "Disassembling Fairing" in the "Frame" chapter").

●Place a container under the drain bolt [A] at the bottom of pump cover.

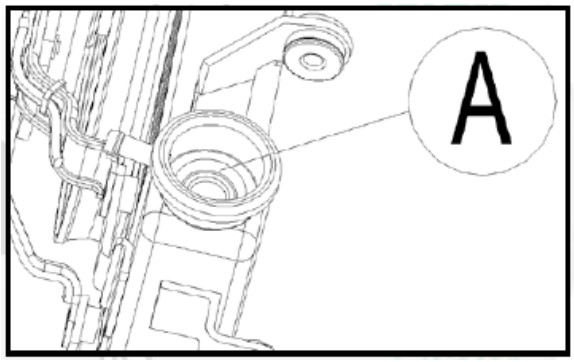
●Remove the drain bolt [A] and discharge the coolant in the radiator and engine.



●Removing:
Clamp [A]
Hose [B],
Bolt [D],
Reserve tank [C],
Overflow hose [F],
●Remove the cover [E] and pour the coolant into a container.
●Install the reserve tank [C] and install the hose [B] of reserve tank and overflow hose [F] back correctly.
●Tighten the bolt [D].
Tightening torque of reserve tank bolt: 9.8 N·m
●Tighten the drain bolt (with gasket).
○Replace the gasket of drain bolt.
Tightening torque of coolant drain bolt: 10 N·m



●Add coolant to the radiator until the level reaches the filler neck [A] of radiator and then close the radiator cap.



Remark
○*Slowly pour the coolant to exhaust the air in the engine and radiator.*

●Pour the coolant until the level reaches the full level of fluid storage tank and then close the cover.

Note
Use the recommended coolant (Benelli part No.: 06109P250000) preferentially. If other coolant is used, the engine may be damaged or the performance of engine may be reduced.

Note
The antifreeze in the cooling system must be soft water or distilled water. If the hard water is used in the cooling system, the incrustation will deposit in the water pipe, which will greatly reduce the efficiency of cooling system.

●Exhaust the air in the radiator according to the following steps:

○Start the engine (the radiator cap has been removed) and make the engine run at the speed of 3000 RPM to 4000 RPM until no bubble can be seen in the coolant [A].

○Lightly pat the radiator hose to discharge the bubbles in the hose.

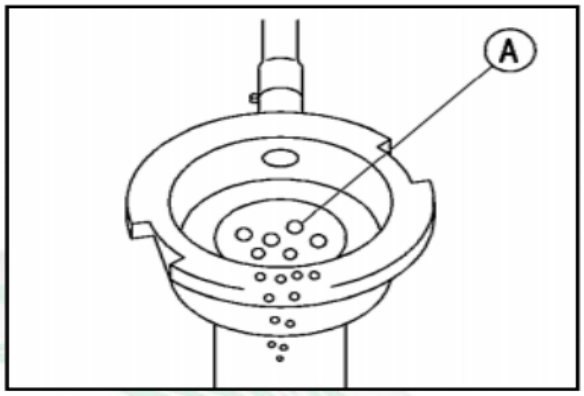
○Shut off the engine and add the coolant until the level reaches the filler neck of radiator.

●Tighten the radiator cap.

●Start the engine and make it become hot thoroughly until the radiator fan runs and then turn off the engine.

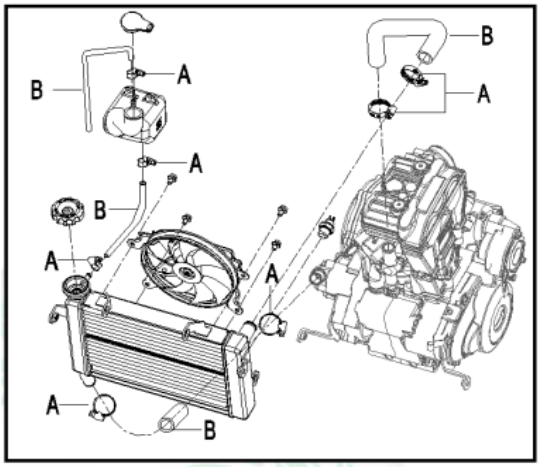
●After the engine is cooled, check the level of coolant in the reserve tank.

★If the coolant level is lower than the lower fluid level line, add coolant until the level reaches the highest fluid level line.



Note
Do not exceed the highest level line when adding the coolant.

Replacing Radiator Hose



●Drain the coolant (see “Replacing Coolant”).

●Removing:

Engine fairing (see “Disassembling Engine Fairing” in the “Frame” chapter),

Side cover (see “Disassembling middle side cover” in the “Frame” chapter),

Clamp [A]

Water pipe [B]

●Install the new hose and then tighten the pipe clamp.

Locking torque of radiator hose (water pipe) clamping screw: 2.0 N·m

●Add the coolant (see “Replacing Coolant”).

●Check whether the cooling system leaks.

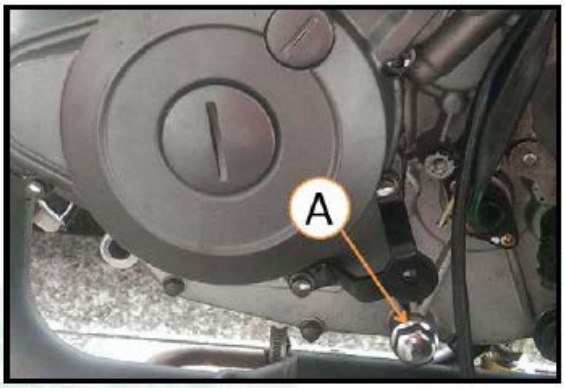
Replacing Oil

●After the engine becomes hot, place the motorcycle vertically and make it be perpendicular to the ground.

●Remove the oil drain bolt [A] to discharge the oil.

○Place an appropriate container under the oil drain bolt [A] to collect the oil.

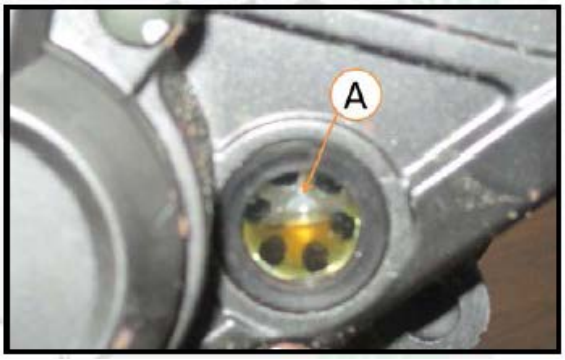
●Drain: oil in the crankcase.



●Tighten the oil drain bolt.

Tightening torque of oil drain bolt: 22 N·m

●Pour the oil of the specified type according to the specified quantity.



Note
Make sure that the oil level is between the oil lens [A]

Recommended oil

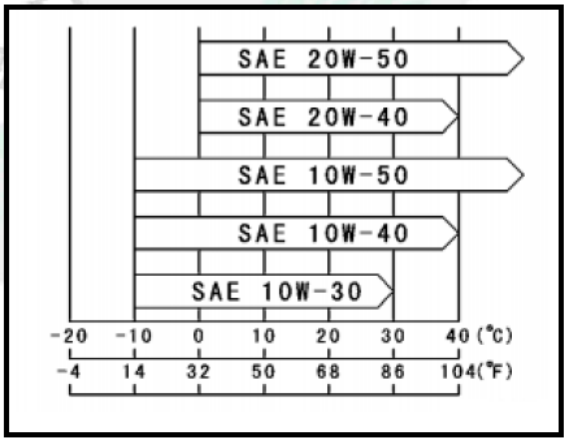
Model: API SE, SF or SG

API SH, SJ or SL, JASO MA, MA1 or MA2

Viscosity: SAE 10W-50

Capacity: 1.2 L (when replaced);

1.5L (Engine is disassembled completely)



Remark
○Do not add any chemical additives to the oil! The oil which meets the above requirements has been carefully prepared and can provide enough lubrication action to the engine and clutch.
○Although the oil with the viscosity of 10W-50 is recommended for most cases, the corresponding change is also needed according to the atmospheric conditions of the specific using areas.

Replacing Brake Hose

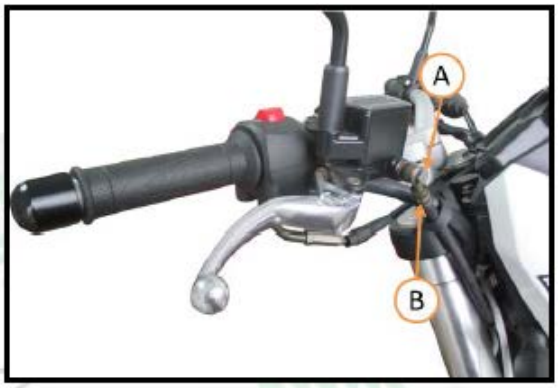
Note
The brake fluid will quickly corrode the surfaces of painted parts, therefore, if the brake fluid splashes on any plastic part, it must be thoroughly rinsed immediately.

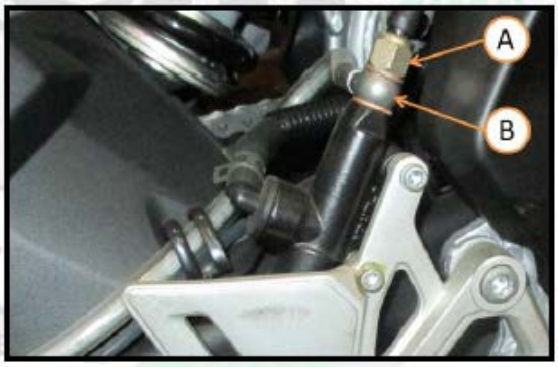
●Remove the banjo bolt [A] of brake hose.

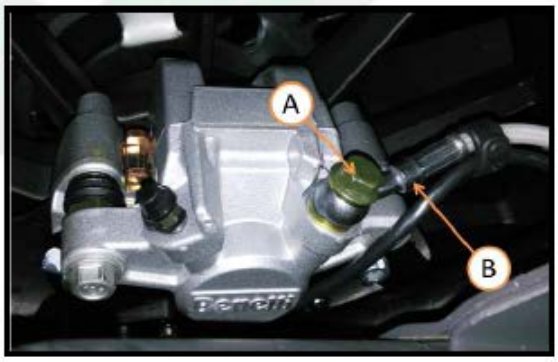
●When the brake hose is removed, do not splash the brake fluid on any painted parts.

●When the brake hose [B] is removed, temporarily fix the end of brake hose to a higher position to minimize the loss of brake fluid.

●If the brake fluid spills, clear it immediately.







●Each side of brake pipe accessory is equipped with gasket. The gasket shall be replaced with a new one during installation.

●Tightening:

Locking torque of brake hose banjo bolt: 25 N·m

●When the brake hose is installed, avoid significant bending, kinking, extrusion or twisting and arrange it according to the section in the “Appendix” chapter: “Winding Method of Cable, Wire and Hose”.

●Fill the brake hose with brake fluid after the brake hose is installed. (See “Replacing Brake Fluid”).

Replacing Rear Brake Fluid Pipe

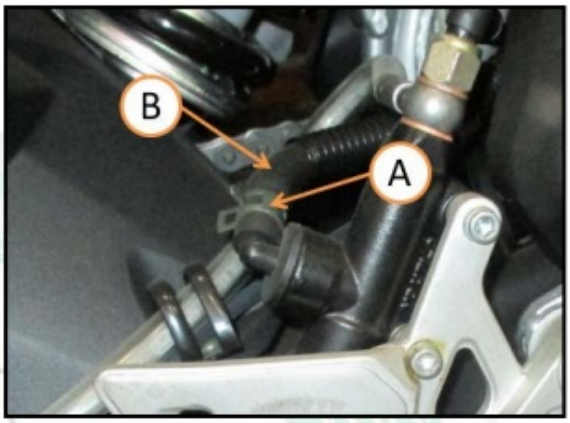
Note
The brake fluid will quickly corrode the surfaces of painted parts, therefore, if the brake fluid splashes on any plastic part, it must be thoroughly rinsed immediately.

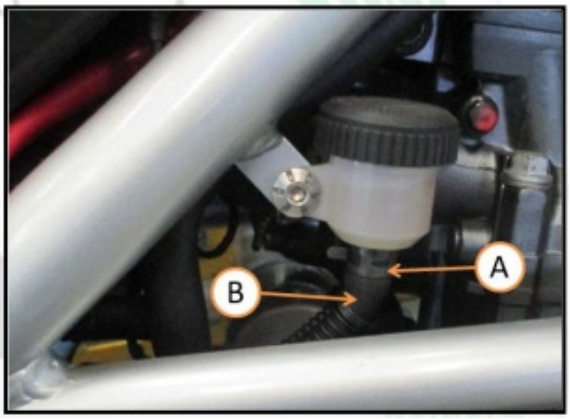
●Remove the rear brake fluid pipe clamp [A].

●When the rear brake fluid pipe is removed, do not splash the brake fluid on any painted parts.

●When the rear brake fluid pipe [B] is removed, temporarily fix the end of brake hose to a higher position to minimize the loss of brake fluid.

●If the brake fluid spills, clear it immediately.





●The clamp needs to be replaced with a new one when the rear brake fluid pipe is installed.

●When the brake hose is installed, avoid significant bending, kinking, extrusion or twisting and arrange it according to the section in the “Appendix” chapter: “Winding Method of Cable, Wire and Hose”.

●Fill the rear brake fluid pipe with brake fluid after the rear brake fluid pipe is installed. (See “Replacing Brake Fluid”).

Replacing Brake Fluid

●Park the motorcycle on the flat ground

Remark
○Support the motorcycle with center stand and ensure that the motorcycle is vertical

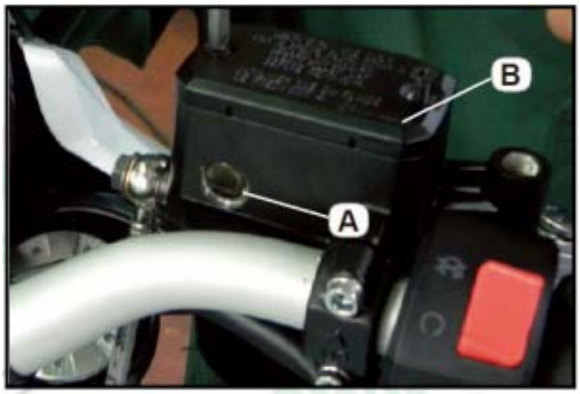
●Check the brake fluid level

★If the level is lower than the lowest sign (the position of oil lens [A]), add the recommended brake fluid to the correct level

●Remove the brake fluid cylinder cover [B] from the brake pump

○Check the brake fluid cylinder diaphragm on the cylinder.

★If there is any damage/wear, please replace the brake fluid cylinder diaphragm



Note
The brake fluid will quickly corrode the surfaces of painted parts, therefore, if the brake fluid splashes on any plastic part, it must be thoroughly rinsed immediately.

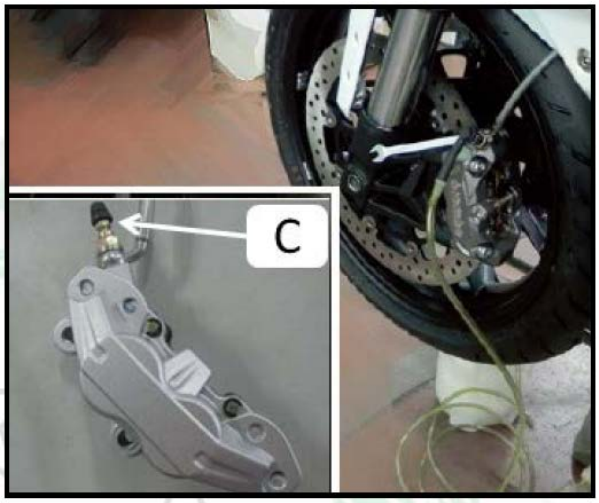
●Apply the brake handle and add the brake fluid until the brake fluid level is higher than the oil lens of brake master cylinder

Warning
Only use the specified brake fluid. Other brake fluids can cause the deterioration of rubber washer, leakage and improper operation of brake system. **Use the same brake fluid which exists in the system when adding the brake fluid. The mixture of different brake fluids can cause harmful chemical reactions, which will reduce the performance of brake system.** **Be careful not to let water enter into the oil cup when adding the brake fluid. Water will significantly reduce the boiling point of brake fluid and generate steam bubbles after being heated, which will reduce the performance of brake system.**

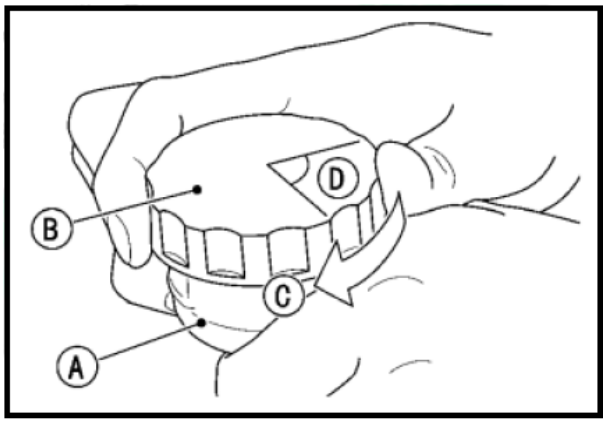
Remark
○The replacement steps of front brake fluid are as follows. The replacement steps of rear brake fluid are the same as that of front brake fluid.

●Replacing Brake Fluid

1. Keep the main oil cylinder in the horizontal state and disassemble the brake fluid cylinder cover.
2. Install a pipe at the front end of oil drain screw [C] and prepare the oil storage container at the other end of pipe.
3. Unscrew the oil drain screw.
4. Apply the brake and release the brake for several times until no brake fluid drain from the oil drain screw.
5. Lock the oil drain screw.
6. Pour the brake fluid above the lower limit.
7. Apply the brake handle to make the brake fluid pipe is filled with brake fluid.
8. Slowly operate the brake handle until no bubble generates from the small hole inside the brake fluid cylinder and the force of brake handle is felt.
9. Release the air.
10. After the adjustment is completed, carry out installation in the order contrary to the disassembly order.



Remark
○Check the level of brake fluid in the oil cup frequently and add new brake fluid as needed. If the brake fluid in the oil cup is exhausted during the replacement of brake fluid, the air in the brake pipe must be bled.



●Remove the transparent plastic hose.

●Install the diaphragm and fluid reservoir can.

●Install the rear brake fluid reservoir can correctly according to the following steps.

○First, tighten the front/rear brake fluid reservoir cans [B] with hands clockwise [C] until a little bit of resistance is felt, which indicates that the cap has been fixed to the pump cup on the storage tank, hold the brake fluid reservoir can [A] and then rotate another turn 1/6 turn [D].

●Tightening:

Locking torque of front brake fluid cup cover fastening screw: 1.2N·m

●Tighten the air bleeding screw and install the rubber cover.

Locking torque of air bleeding screw: 7.8 N·m

●After the brake fluid is replaced, check whether the braking performance of brake is good, braking is blocked or brake fluid leaks.

★If necessary, blow out the air in the brake pipe.

Replacing Rubber Parts of Brake master cylinder

Disassembling Front Brake master cylinder

●Remove the front brake master cylinder (see “Disassembling Front Brake master cylinder” in the “Brake” chapter).

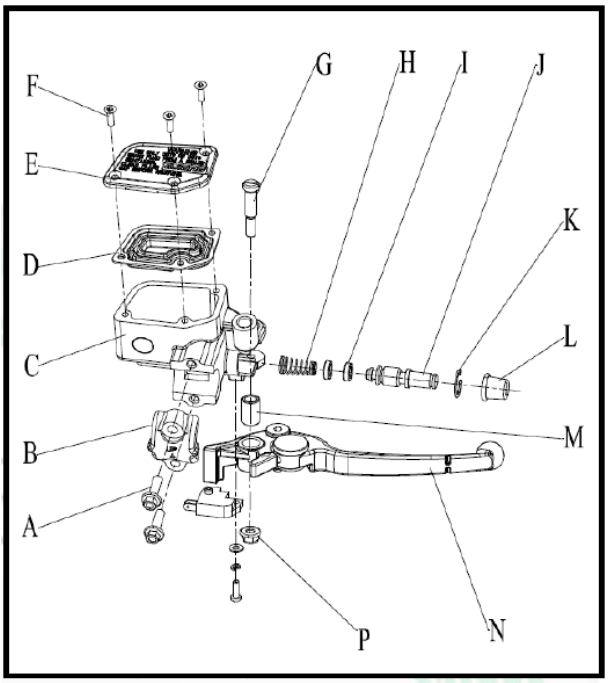
●Remove the fluid reservoir can fixing screw [F], fluid reservoir can [E], connector [C] and O-ring seal.

●Screw off the locknut [E] and fulcrum shaft bolt [F] and then remove the brake handle.

●Remove the snap spring [G].

Special tool—inside circlip plier:

●Pull out the piston assembly [H].



Note
Do not remove the cup [I] from the piston, because it is damaged when removed.

●Replacing:

Seal cover: [A],

Snap spring: [B],

O-ring seal: [D],

Snap spring: [G],

Piston assembly: [H],

Diaphragm: [I].

Disassembling Rear Brake Master Cylinder

●Remove the rear brake master cylinder (see "Disassembling Rear Brake master cylinder" in the "Brake" chapter).

●Remove the connector [H] and O-ring seal [H].

●Slide out the dust cover [A]

●Remove the snap spring [B].

Special tool—inside circlip plier:

●Take the piston assembly [D] and reset spring [F].

Note
Do not remove the cup [C] and cup [E] from the piston, because they are damaged when removed.

●Replacing:

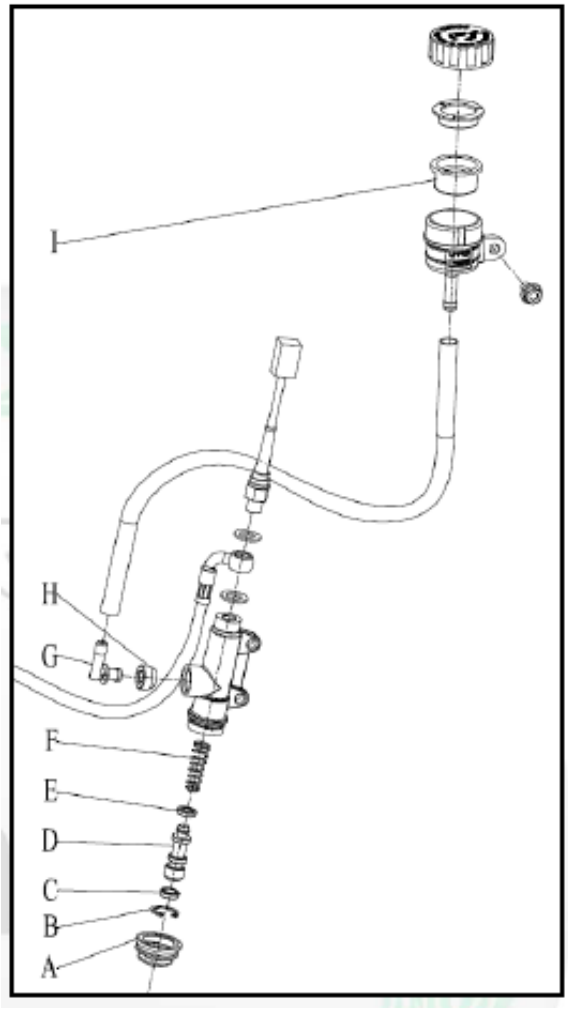
Dust cover [A]

Snap spring: [B],

Piston assembly [D],

Ring seal [H],

Diaphragm: [I].



Assembling Brake master cylinder

●Before assembly, use the brake fluid or ethnaol to clean all parts, including the brake master cylinder.

Note
Except for the brake pad and disc brake, other brake parts can only be cleaned by disc brake fluid, isopropyl alcohol or ethanol. Do not use any other fluid to clean above parts. Gasoline, oil or any other petroleum distillate can corrode the rubber parts. If oil splashes onto any part, it will be difficult to clean it thoroughly and the rubber parts inside the disc brake will be corroded eventually.

●Apply the brake fluid to the new parts and inner wall of brake caliper.

●Be careful not to scratch the piston or inner wall of brake caliper.

●Apply silicone grease to the brake handle fulcrum shaft bolt.

●Tighten the brake handle fulcrum shaft bolt and locknut.

Locking torque of front brake fluid reservoir cap fastening screw: 1.2 N·m

Locking torque of front brake handle fulcrum shaft bolt: 3.0 N·m;

Locking torque of front brake handle fulcrum shaft bolt locknut: 6 N·m

Replacing Rubber Parts of Calipers

Disassembling Front Calipers

●Before the front calipers are disassembled, drain the front brake fluid.

●Loosen the front calipers mounting bolt [A] and banjo bolt [B], and then gently unscrew them.

●Removing:

Front calipers [C] (see “Disassembling Front Calipers” in the “Brake” chapter),

Front brake pad (see “Disassembling Front Brake Pad” in the “Brake” chapter),

Front calipers assembling bolt

O-ring seal

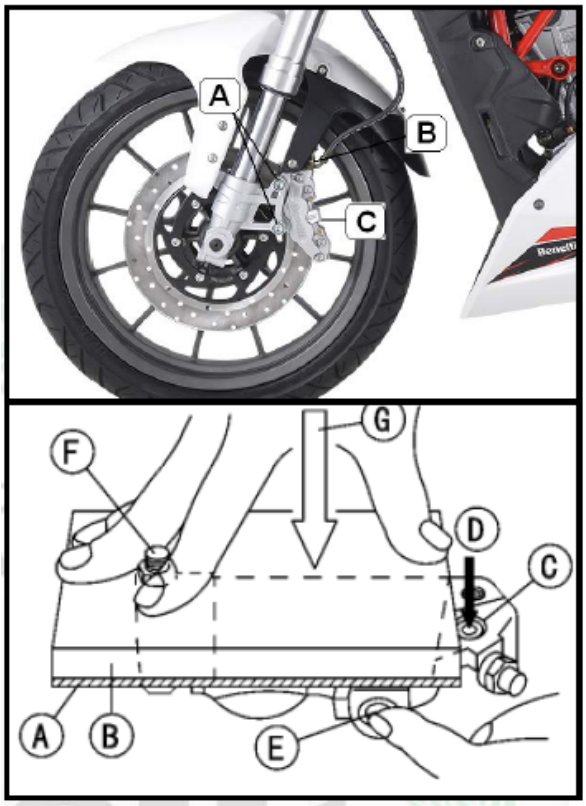
●Remove the piston by using the compressed air.

A piston removal method is shown below:

○Install a rubber gasket [A] and a wood board [B] with thickness of more than 10 mm (0.4 in.) in the middle of the calipers. Fix the rubber gasket and wood board together with appropriate bolts and nuts as shown in the figure. Keep one of the oil passage open[C].

○Slowly inject the compressed air [D] into the oil passage until the piston touches the rubber gasket. If the calipers are in a half-open condition, the hose joint [E] shall be blocked during operation.

Press the bolt [F] and nut: [G].



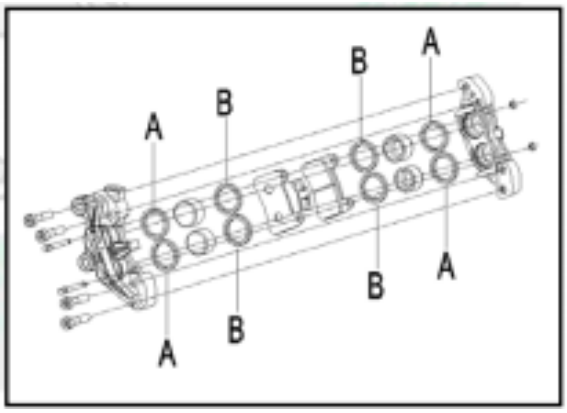
⚠Warning

In order to avoid serious injury, do not put your finger or palm in front of the piston! Otherwise, the piston will crush the hand or finger when the compressed air is injected into the calipers.

○Pull out the piston with hands.

●Remove the dust seal [A] and oil seal [B].

●Repeat the above steps and remove the piston from the other side of calipers body.



Remark

○If the compressed air cannot be used, remove the piston from the two calipers according to the following method (the brake hose is connected with the calipers).

○Prepare a container to contain the brake fluid.

○Remove the brake pad spring and brake pad (see “Disassembling Front Brake Pad” in the “Brake” chapter).

○Press the brake rod until the piston is pushed out of the brake caliper and then remove the calipers.

Assembling Front Calipers

●Clean the calipers parts (except for the brake pad).

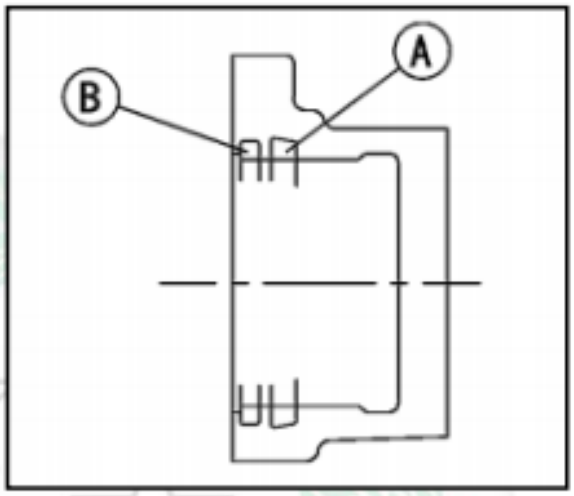
Note
The parts must be cleaned by using the disc brake fluid, isopropyl alcohol or ethanol!

●Replacing the new oil seal [A].

○Add the silicone grease to the oil seal, and then install it into the brake caliper with hands.

●If the dust seal [B] is broken, replace it with a new one!

○Add the silicone grease to the dust seal, and then install it into the brake caliper with hands.



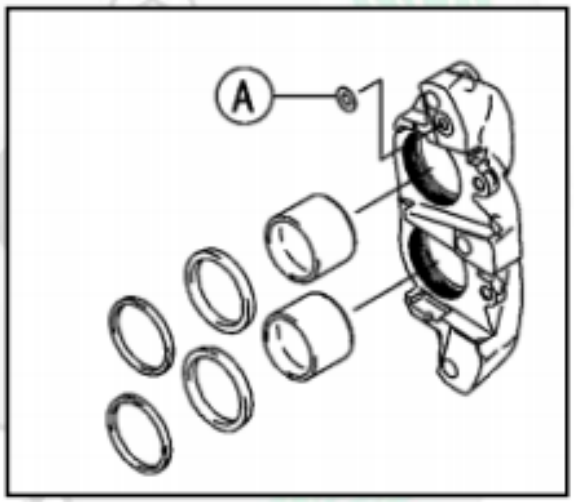
●Replace the O-ring seal [A].

●Apply the brake fluid to the outside of piston and press it into the brake caliper with hands.

●Make sure the O-ring seal is installed.

●Apply some Loctite to the threads of front calipers assembling bolts and then tighten the bolts.

Locking torque of front calipers assembling bolt: 27 N·m



●Install the brake pad (see “Installing Front Brake Pad” in the “Brake” chapter).

●Wipe up the brake fluid which is splashed onto the calipers with a wet cloth.

Disassembling Rear Calipers

●Loose the rear calipers banjo bolt [A] and then tighten it gently (do not screw it too tightly).

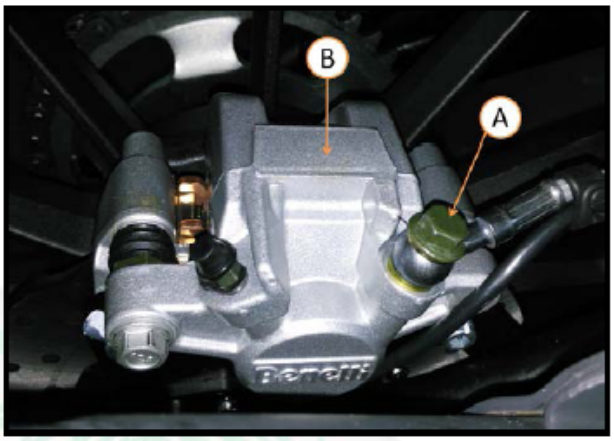
●Removing:

Rear calipers [B] (see “Disassembling Rear Calipers” in the “Brake” chapter),

Brake pad (see “Disassembling Rear Brake Pad” in the “Brake” chapter),

Rear calipers assembling bolt,

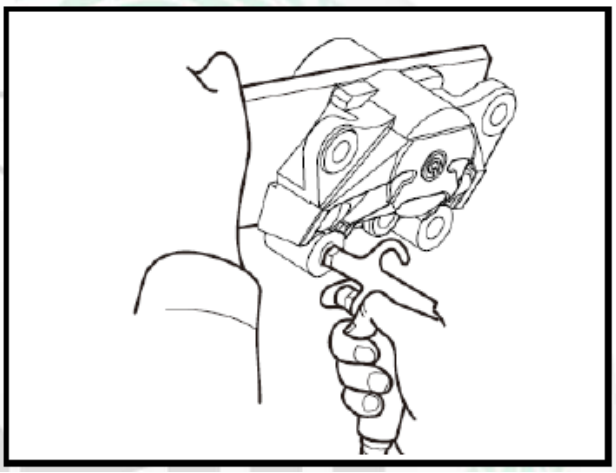
O-ring seal



●Remove the piston on the calipers according to the following method.

●The method for removing the piston on the calipers it the same as that for removing the front calipers.

●Withstand the piston on the calipers with a piece of wood and blow the compressed air into the brake hose joint to squeeze the piston of calipers



⚠Warning
In order to avoid serious injury, do not put your finger or palm in front of the piston! Otherwise, the piston will crush the hand or finger when the compressed air is injected into the calipers.

●Removing:

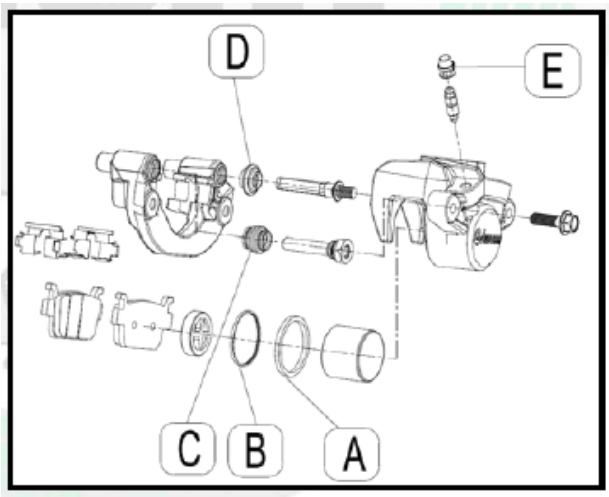
Oil seal [A],

Dust seal [B],

Guide rod dust cover I [C],

Guide rod dust cover II [D],

Deflating valve dust cover [E]



Remark
○*If there is no compressed air, remove the piston from the two calipers according to the following method (the brake hose is connected with the calipers).* ○*Prepare a container to contain the brake fluid.* ○*Remove the brake pad spring and brake pad (see “Disassembling Rear Brake Pad” in the “Brake” chapter).* ○*Press the brake pedal and remove the calipers piston.*

Assembling Rear Calipers

●Clean the calipers parts (except for the brake pad).

Note
The parts must be cleaned by using the disc brake fluid, isopropyl alcohol or ethanol!

●Install the deflating screw and deflating valve dust cover.

Locking torque of deflating screw: 7.8 N·m

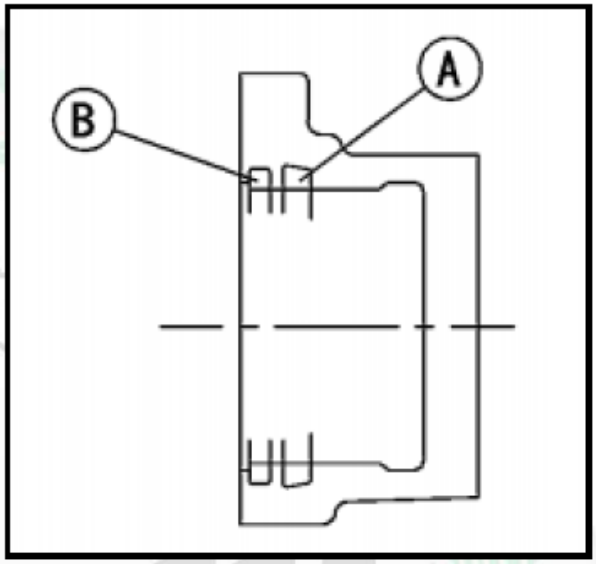
●Apply the brake fluid to the inner wall of brake caliper.

●Replace with a new oil seal [A].

○Add the silicone grease to the oil seal, and then install it into the brake caliper with hands.

●Replace with a new dust seal [B].

●Apply the brake fluid to the outside of piston and press it into the brake caliper with hands.



●Replace the guide rod dust cover I [C] and guide rod dust cover II [D].

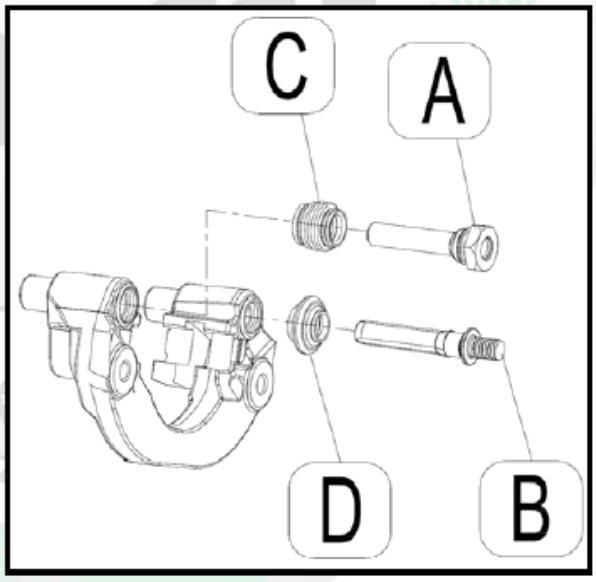
●Apply the grease to the guide rod dust cover I [C] and guide rod dust cover II [D] and install the guide rod [A] and guide rod [B].

●Apply some Loctite to the threads of rear calipers assembling bolts and then tighten the bolts.

Locking torque of rear calipers assembling bolt: 37 N·m

●Install the brake pad (see “Installing Rear Brake Pad” in the “Brake” chapter).

●Wipe up the brake fluid which is splashed onto the calipers with a wet cloth.



Replacing Spark Plug

●Remove the ignition coil (see “Disassembling Ignition Coil” in the “Electrical System” chapter).

●Remove the spark plug [A] vertically with the wrench for spark plug.

●Replace a new spark plug.

Standard Spark Plug

Model: NGK CR8E

●Insert a new spark plug into the spark plug hole and press the spark plug tightly with your finger.

●Use the wrench [A] for spark plug to tighten the spark plug vertically.

Note
If the wrench is tilted when the spark plug is tightened, the insulator of spark plug may be broken.

Locking torque of spark plug: 13 N·m

●Fix the ignition coil firmly.

○Make sure that the fixed ignition coil is not easy to loosen.

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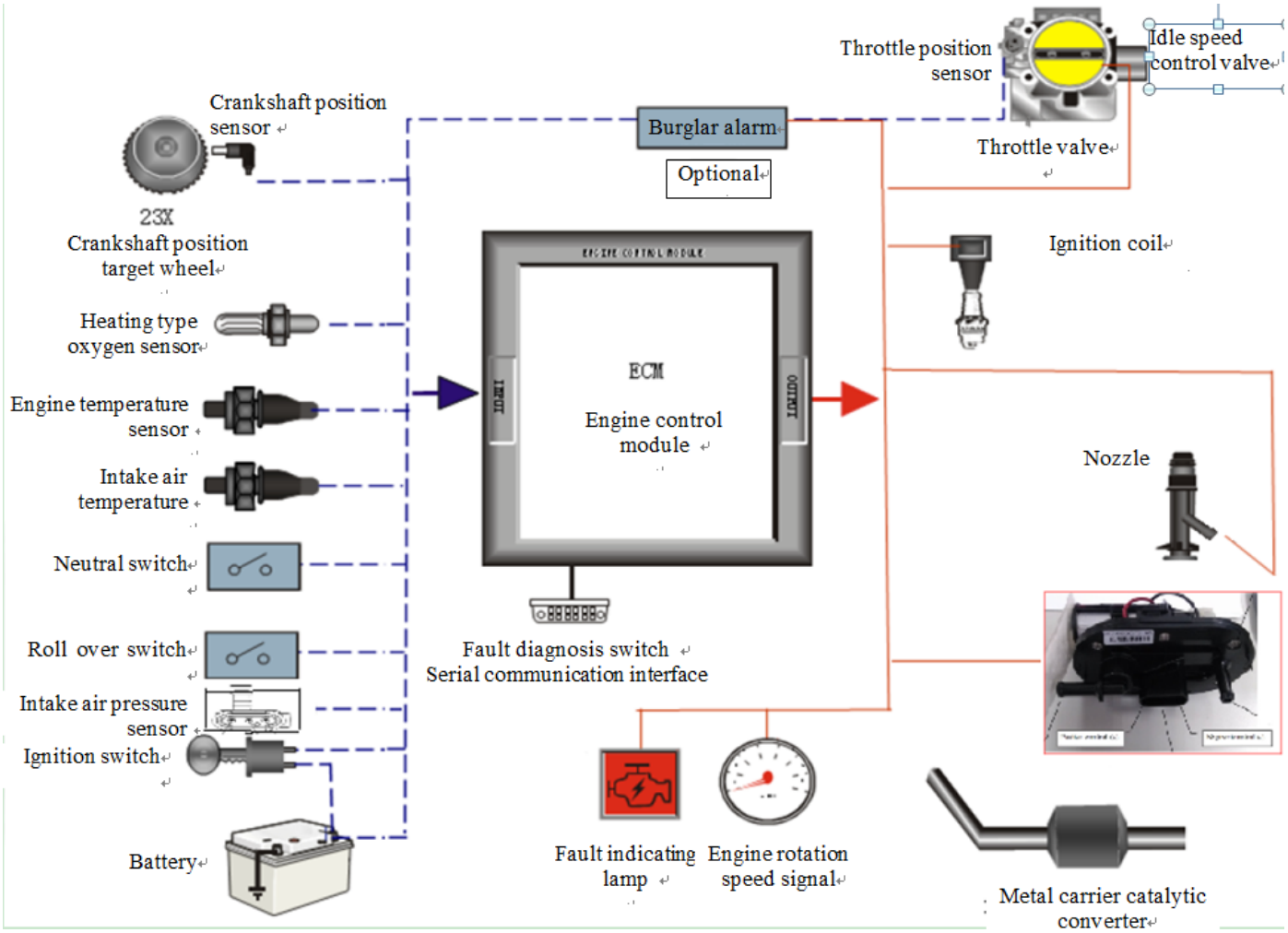
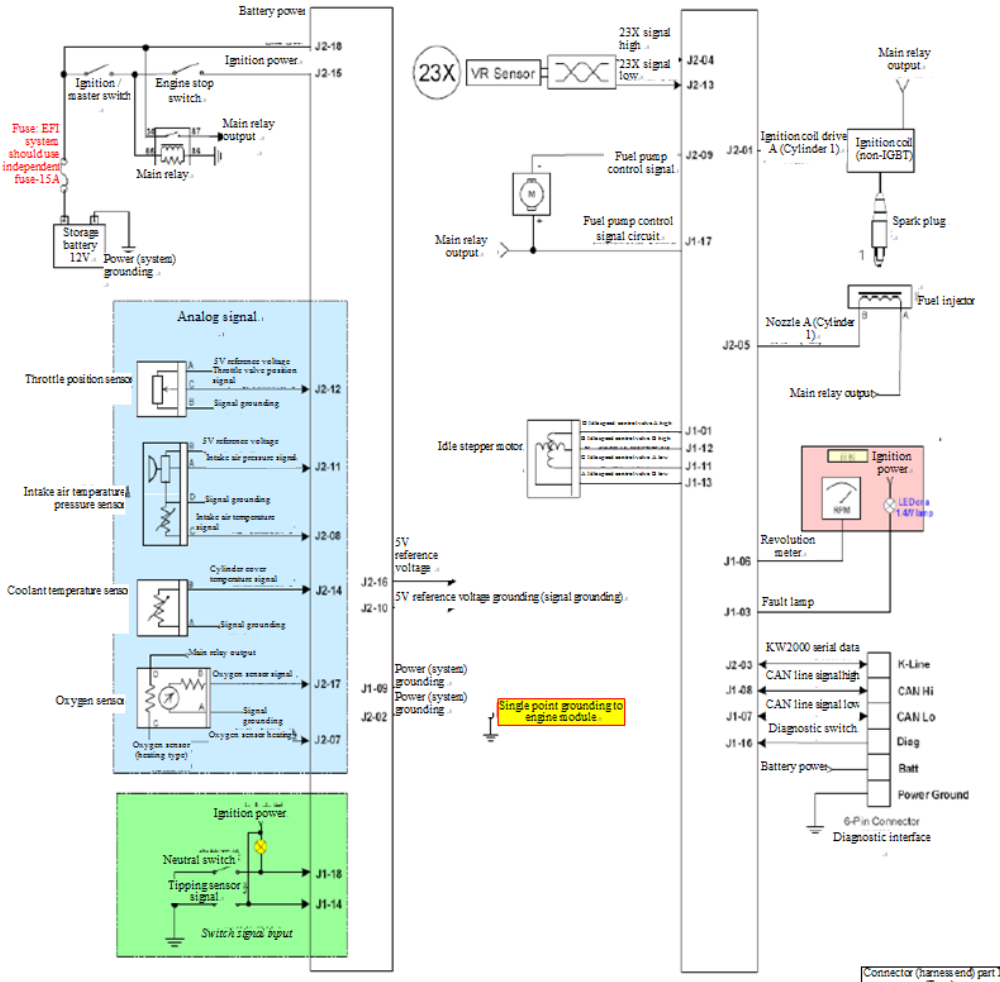
Introduction to EFI

This motorcycle adopts the small engine EFI (electronic fuel injection) system of Delphi Corporation. This system achieves closed-loop control, fuel injection and ignition control through oxygen sensor. Three-way catalytic converter is used to treat the gas after the combustion of engine, to convert it into harmless gas and discharge it to the atmosphere. This system uses closed-loop control self-learning system, which can effectively eliminate the manufacturing differences of system and related mechanical parts, improve the overall consistency of the motorcycle, and eliminate the error of motorcycle caused due to wear and other causes after actual use.

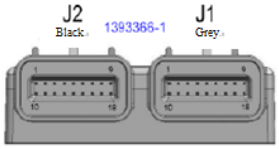


EFI System



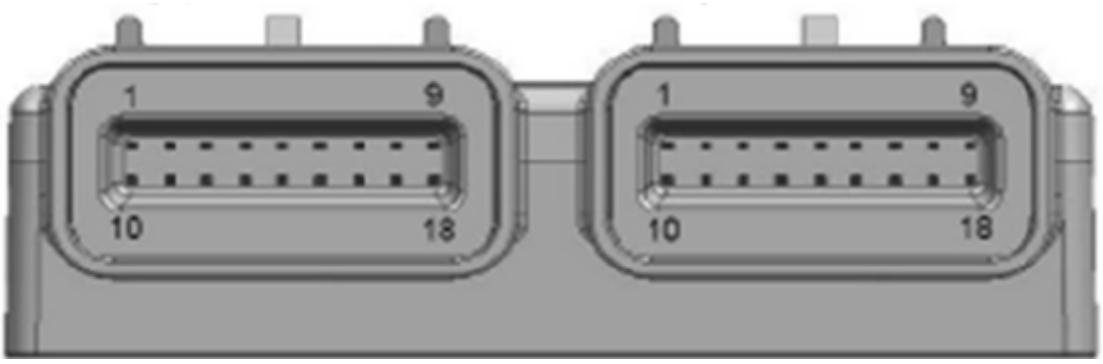
Connector	Function description
J1-1	Idle speed control valve A high
J1-2	
J1-3	Fault lamp
J1-4	
J1-5	
J1-6	Revolution meter
J1-7	CAN line signal low
J1-8	CAN line signal high
J1-9	Power (system) grounding
J1-10	
J1-11	Idle speed control valve A low
J1-12	Idle speed control valve B high
J1-13	Idle speed control valve B low
J1-14	Tipping sensor signal
J1-15	
J1-16	Diagnostic switch
J1-17	Fuel pump control signal circuit
J1-18	Neutral switch
J2-1	Ignition coil drive A (Cylinder 1)
J2-2	Power (system) grounding
J2-3	KW2000
J2-4	23 gear signal high
J2-5	Nozzle A
J2-6	
J2-7	Oxygen sensor heating
J2-8	Intake air temperature signal
J2-9	Fuel pump control signal
J2-10	5V reference voltage grounding (signal grounding)
J2-11	Intake air pressure signal
J2-12	Throttle valve position sensor
J2-13	23 gear signal low
J2-14	Cylinder cover temperature signal
J2-15	Ignition power
J2-16	5V reference voltage
J2-17	Oxygen sensor signal
J2-18	Storage battery power

Connector (harness end) part No. (Tyco)	
J1 grey (Grey)	J2 black (Black)
1488533-6	1488533-5



No. of ECU connector

J2 Black (Black) J1 Grey (Grey)

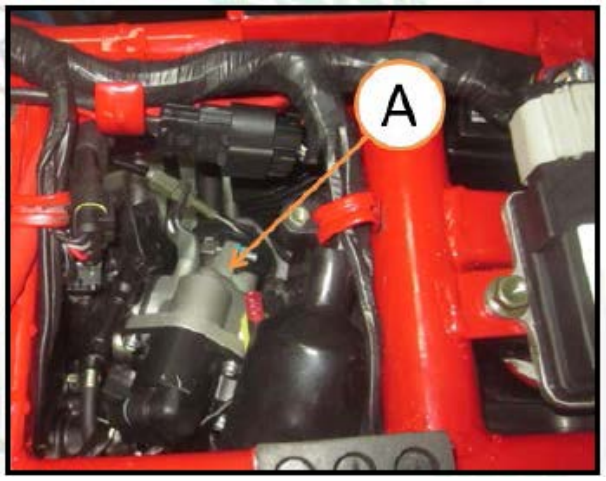


	Function description
J1-1	Idle speed control valve A high
J1-2	
J1-3	Fault lamp
J1-4	
J1-5	
J1-6	Revolution meter
J1-7	CAN line signal low
J1-8	CAN line signal high
J1-9	Power (system) grounding
J1-10	
J1-11	Idle speed control valve A low
J1-12	Idle speed control valve B high
J1-13	Idle speed control valve B low
J1-14	roll over sensor signal
J1-15	
J1-16	Diagnostic switch
J1-17	Fuel pump control signal circuit
J1-18	Neutral switch
J2-1	Ignition coil drive A
J2-2	Power (system) grounding
J2-3	KW2000
J2-4	23 gear signal high
J2-5	Nozzle A
J2-6	
J2-7	Oxygen sensor heating
J2-8	Intake air temperature signal
J2-9	Fuel pump control signal
J2-10	5V reference voltage grounding
J2-11	Intake air pressure signal
J2-12	Throttle position sensor
J2-13	23 gear signal low
J2-14	Cylinder cover temperature signal
J2-15	Ignition power
J2-16	5V reference voltage
J2-17	Oxygen sensor signal
J2-18	battery power

EFI Part Position

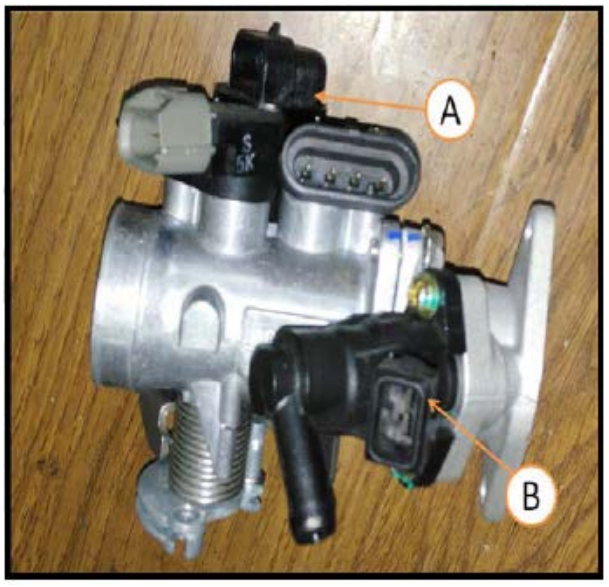
ECU [A]

Throttle body [A]

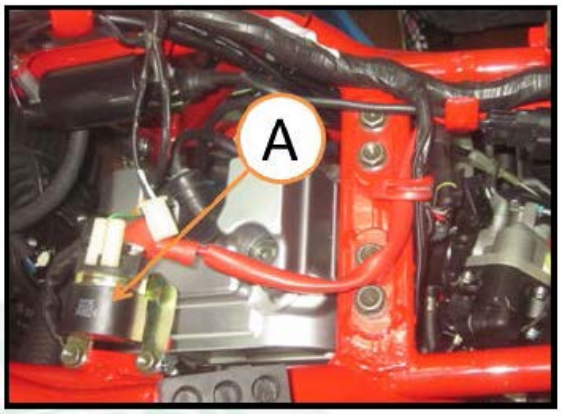


Throttle position sensor [A]

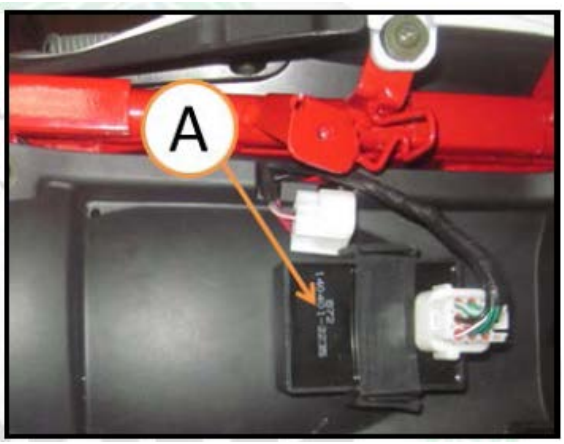
Fuel injector [B]



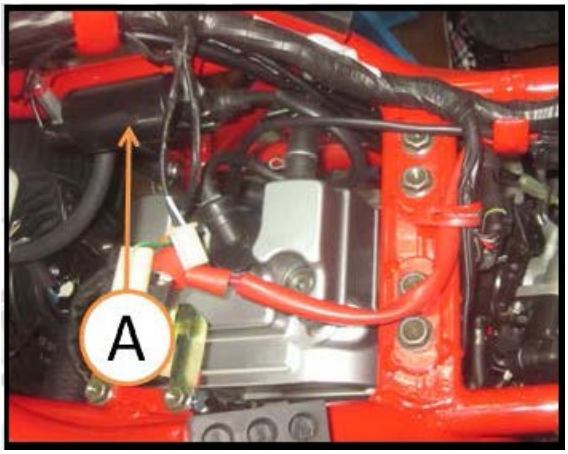
Starting relay [A]



Igniter [A]

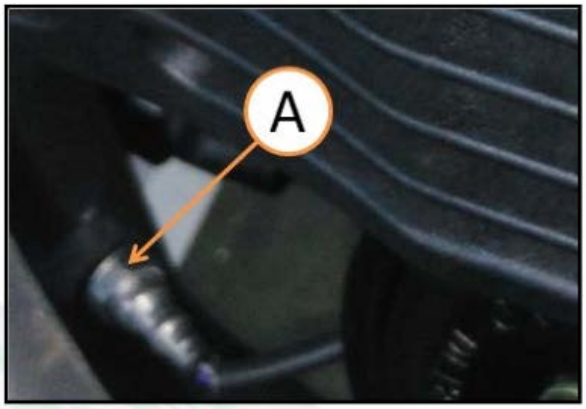


Ignition coil [A]

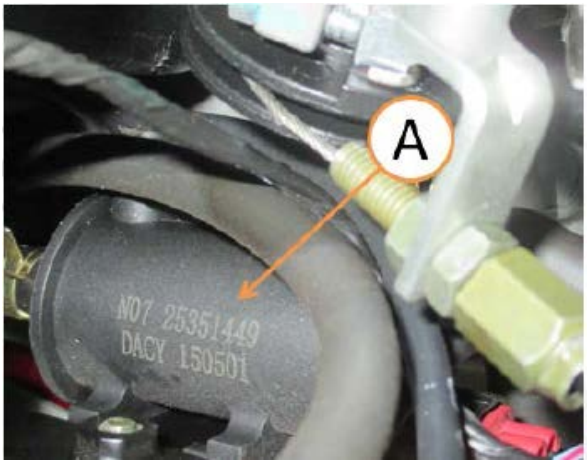


Fuse [A]

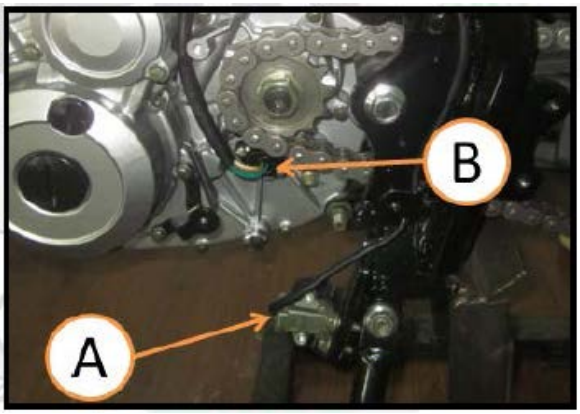
Oxygen sensor [A]



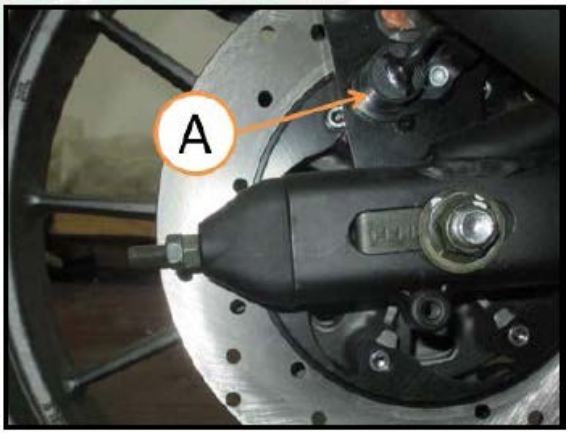
Carbon canister solenoid valve [A]



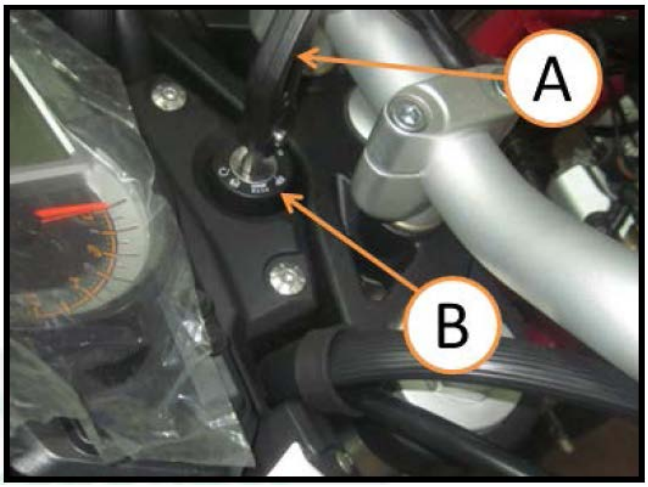
Side stand switch [A]
Gear position sensor [B]



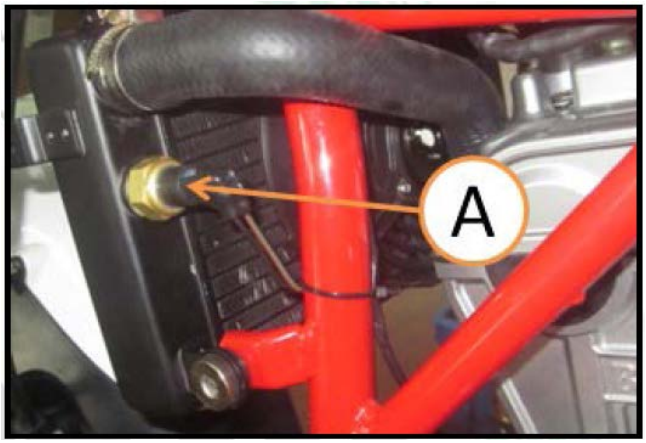
Speed sensor [A]



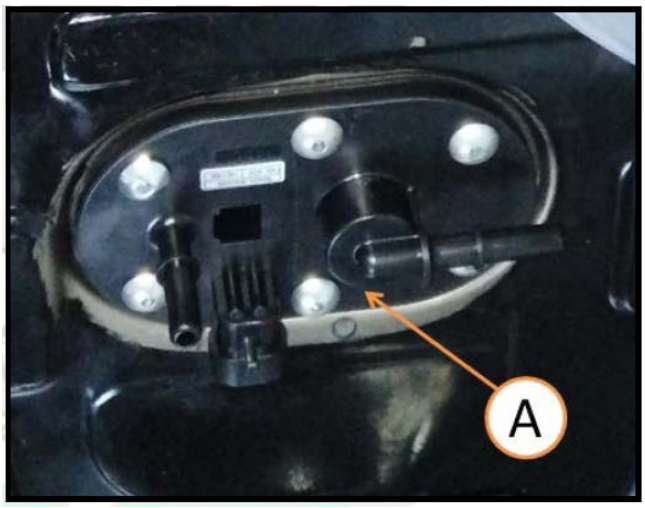
Main switch key [A]
Main switch [B]



Coolant temperature switch sensor [A]



Fuel pump [A]



Technical Parameters

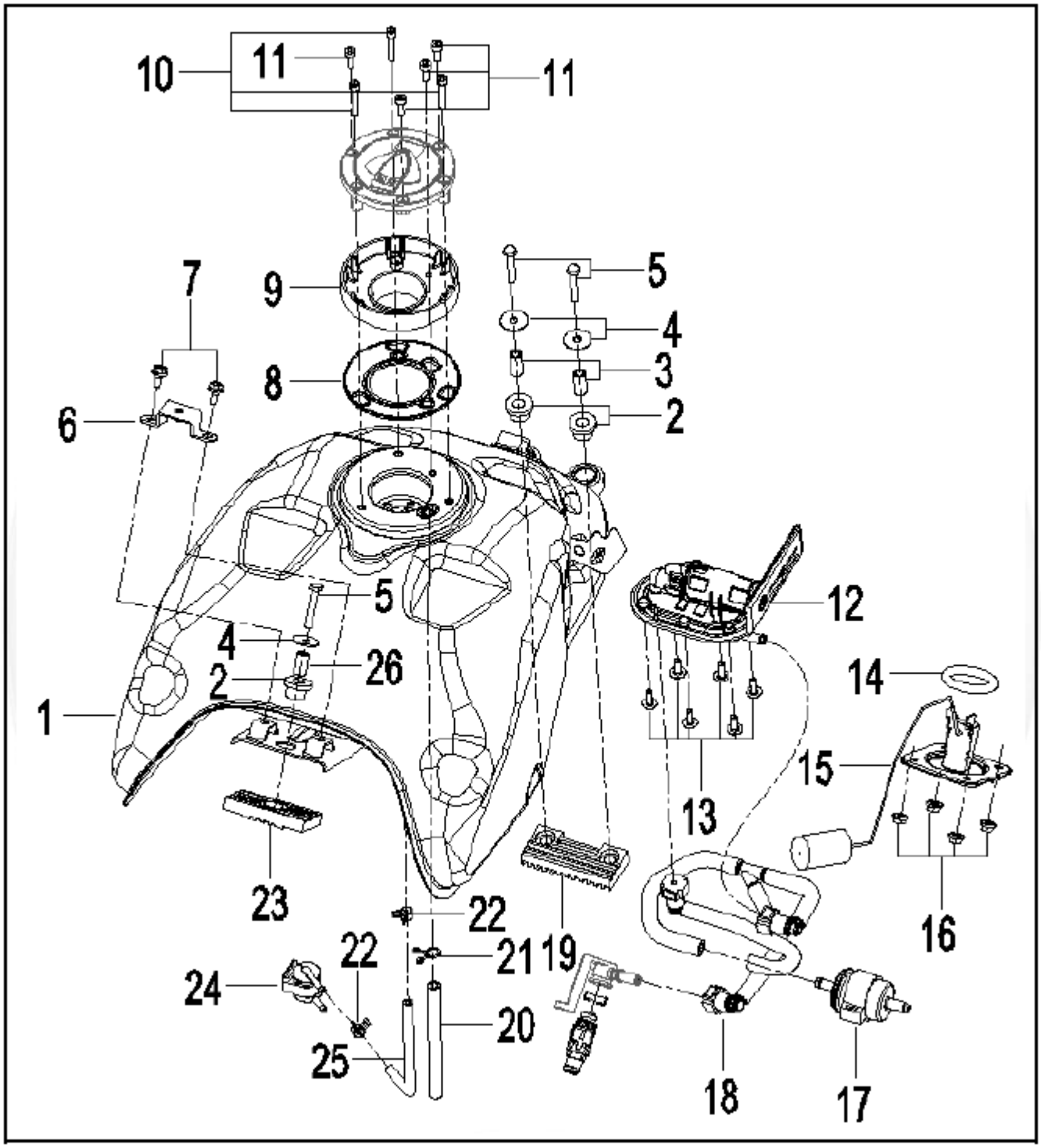
Item	Standard
EFI system	
Idle speed	1400 ±100 r/min (rpm)
Throttle valve assembly:	
Type	Cylinder type
Diameter	Φ34 mm
Negative value of throttle valve	2.7 kPa
Bypass screw	—
ECU:	
Manufacturer	Delphi
Type	Electronic memory type, equipped with IC ignitor, sealed using resin
Avaliable engine rotation speed scope	100 -11 200 r/min (rpm)
Fuel pressure (high-pressure pipe):	250 kPa
Fuel pump:	
Type	Built-in friction fuel pump of fuel tank
Fuel pump capacity	≥67 mL per 3 seconds (2.3 US oz.)
Fuel injector:	
Nozzle style	Finely atomized type,
Resistance:	11.7-12.3Ω at the temperature of 20°C (68°F)
Throttle valve sensor:	
Input power voltage	DC 4.75-5.25 V
Output power voltage	DC 0.63-3.91 V (the opening of throttle valve is idle speed to completely open)
Resistance	4-16Ω
Manifold absolute pressure sensor / atmosphere sensor	
Input power voltage	DC 4.75-5.25 V
Output power voltage	DC 3.80-4.20 V[standard atmospheric pressure]
Intake air temperature sensor:	
Output voltage of ECU	=2.80-2.97 V at the temperature of 20°C (68°F)
Resistance	2.21 -2.69kΩ at the temperature of 20°C (68°F); ≈0.322 kΩ at the temperature of 80°C (176°F)
Coolant temperature sensor	
Output voltage of ECU	≈2.80-2.97 V at the temperature of 20°C (68°F)
Speed sensor:	
Input power voltage	DC 4.75 -5.25 V
Output power voltage	≈ DC 0.05-0.09 V or DC 4.5-4.9V at the state of opening power lock or idle state of motorcycle
Roll over sensor of motorcycle:	
Actuation mode	Magnetic flux detection trigger type
Actuation angle	When the side tipping at left and right is greater than 60-70°
Output voltage	The arrow of sensor is upward: 3.55-4.45 V Angle of inclination of sensor ≥60°-70°: 0.65-1.35V

(Continued)

Item	Standard
Throttle handle and throttle line Free clearance of throttle handle	3-5 mm
Air filter Filter element material	Wet type sponge filter

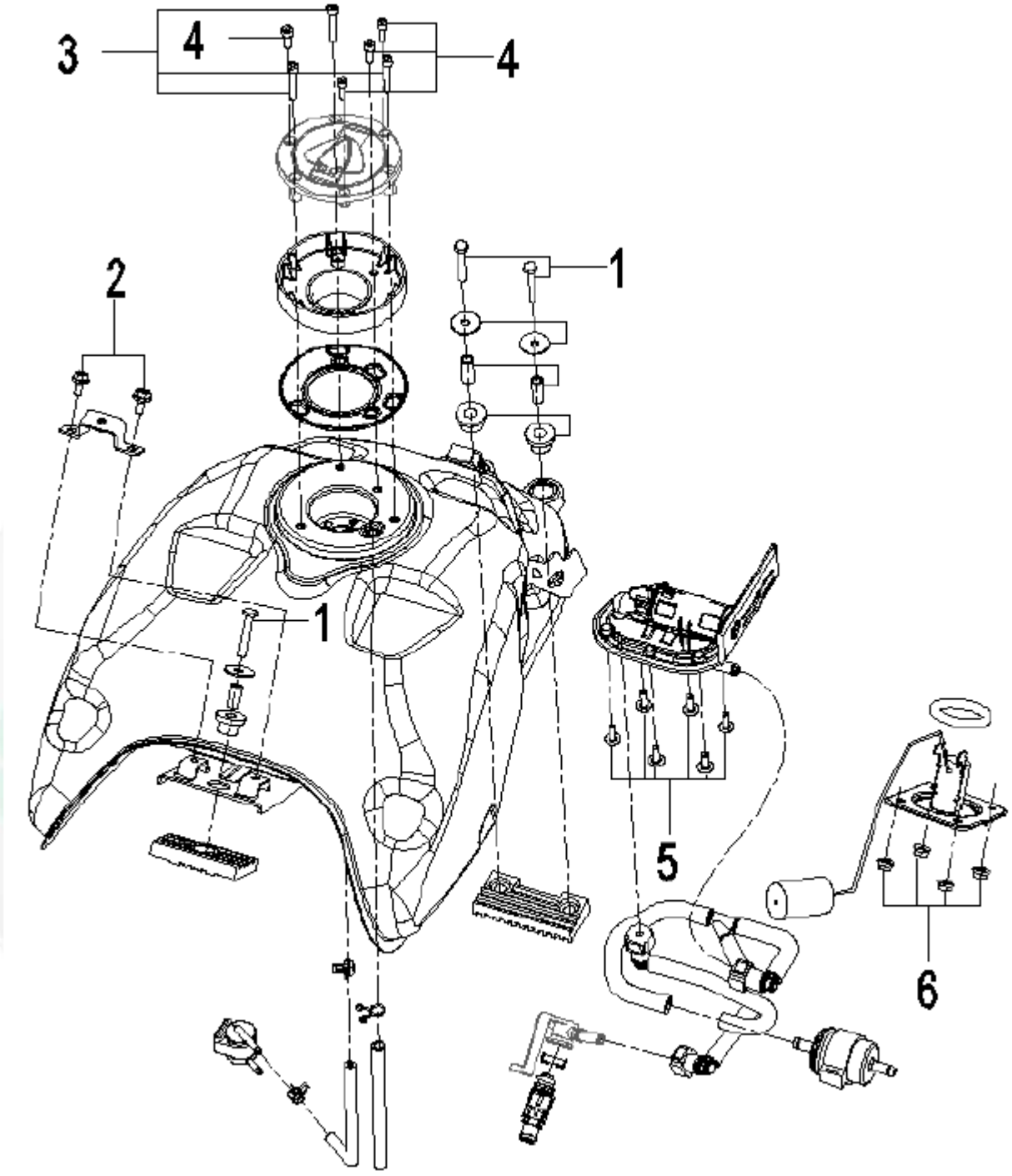
Fuel tank

Fuel tank Exploded View



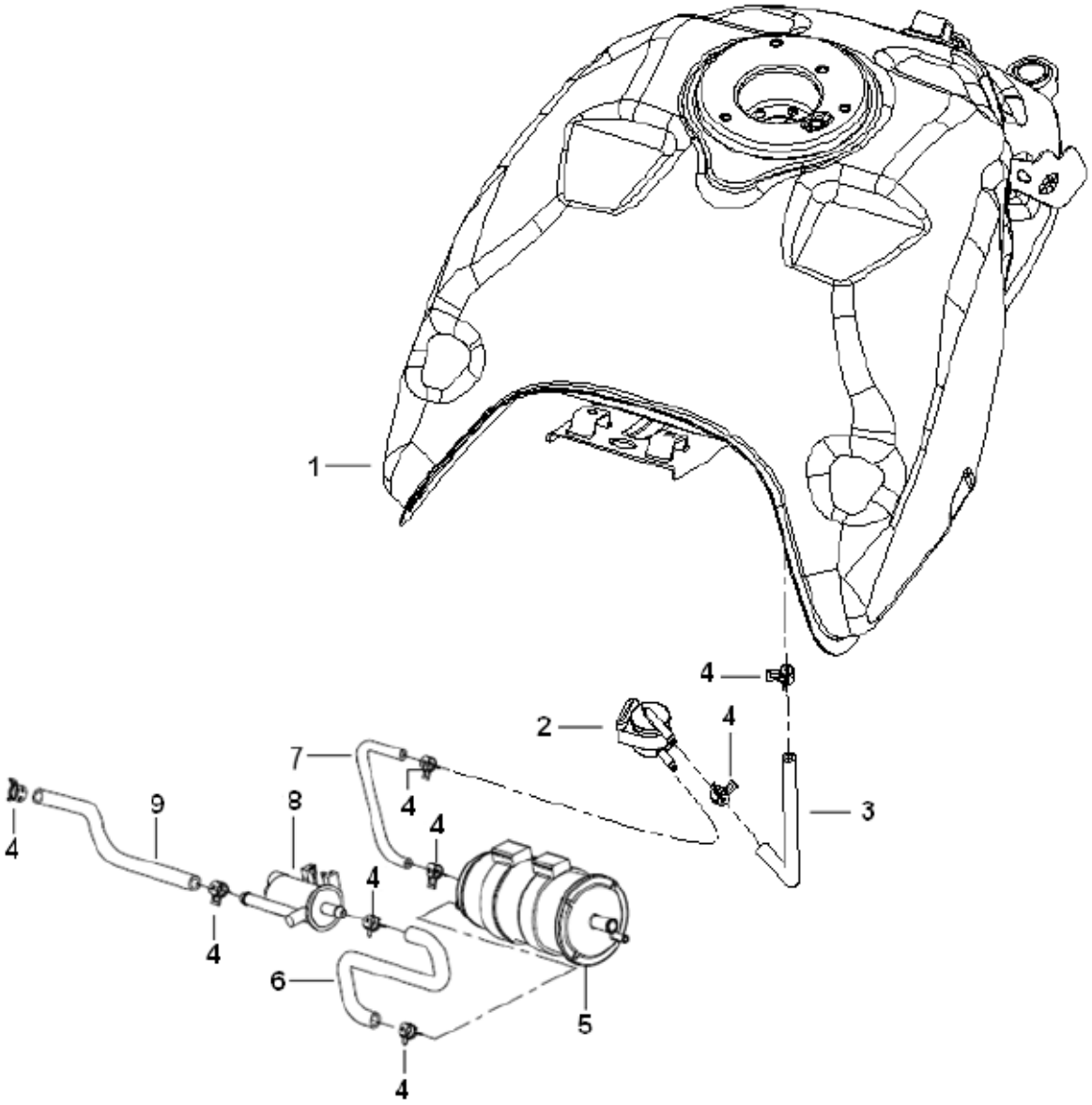
No.	Parts and specifications
1	Fuel tank components
2	Rubber sleeve
3	Fuel tank installing sleeve
4	Fuel tank installing washer
5	Bolt M6×35
6	Front fender installing seat of fuel tank
7	Bolt M6×10
8	Fuel tank cover supporting components
9	Tank cover sealing washer
10	Socket head cap screw M5×30
11	Socket head cap screw M5×14
12	Fuel pump components
13 '	fuel pump screw
14	Sensor rubber cushion
15	Fuel sensor
16	Nut M6
17	Filter
18	Fuel hose
19	Fuel tank installation cushion
20	Overflow pipe
21	Wire clamp Φ10.5
22	Plate-type clamp φ8.5×8×0.6
23	Fuel tank supporting cushion
24	One way valve components
25	Fuel hose 4.5×2×200
26	Fuel tank installation sleeve

Fuel Tank Exploded View



No.	Tightener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Fuel tank mounting bolt	10	1.0	88.5in·lb	
2	Front fender installing seat of fuel tank	10	1.0	88.5in·lb	
3	Fuel tank lock mounting bolt	8	0.8	70.8in·lb	
4	Fuel tank lock decoration screw	6	0.6	53.1in·lb	
5	Fuel pump mounting bolt	10	1.0	88.5in·lb	
6	Fuel level sensor tightening nut	10	1.0	88.5in·lb	

Fuel Evaporative Recovery System

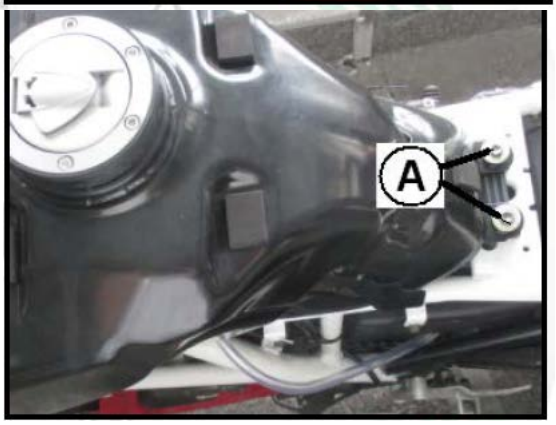


No.	Name and specifications
1	Fuel tank components
2	One way valve components
3	Connecting pipe between fuel tank and One way valve
4	Clamp
5	Carbon canister
6	Connecting pipe between carbon canister and solenoid valve
7	Connecting pipe between one way valve and carbon canister
8	Carbon canister solenoid valve
9	Connecting pipe between carbon canister solenoid valve and engine intake air port

Disassembly of Fuel Tank

- Disassemble rear seat (see “replacement of air filter element”)
- Disassemble front seat (see “replacement of air filter element”)
- Disassemble fuel tank fender
- Disassemble front mounting bolt of fuel tank

- Disassemble rear mounting bolt of fuel tank



- Lift fuel tank, and unplug fuel hose connected with throttle; unplug the connecting pipe between fuel tank and one way valve

Note:
Note to prevent fuel from flowing out when unplugging the fuel hose connected with throttle valve

·Drain the fuel from fuel tank to the container prepared.

Warning:
In the process of drain fuel never place flame near fuel, to avoid fire

- Disassemble oil level sensor
- Disassemble fuel pump
- Check whether there is rust inside the fuel tank, and replace fuel tank in case of serious rust

- Assemble it in reverse order of disassembly

Oil level sensor tightening nut tightening torque: 10 N*m
Fuel pump mounting bolt tightening torque: 4 N*m
Fuel pump lock decoration screw tightening torque: 6 N*m
Fuel pump lock fixing screw tightening torque: 8 N*m
Fuel tank mounting bolt tightening torque: 10 N*m
Front fender installing seat mounting bolt of fuel tank: 10 N*m

Notes for EFI service

There are many notes for service of EFI system.

○This EFI system must be powered by a 12V battery. Do not use any other battery as a power source for EFI system.

○Do not connect the wrong battery cable, or ECU may be damaged.

○To avoid damage to EFI parts, do not disconnect the battery cable or any other electrical connectors while the main switch is on or the engine is running.

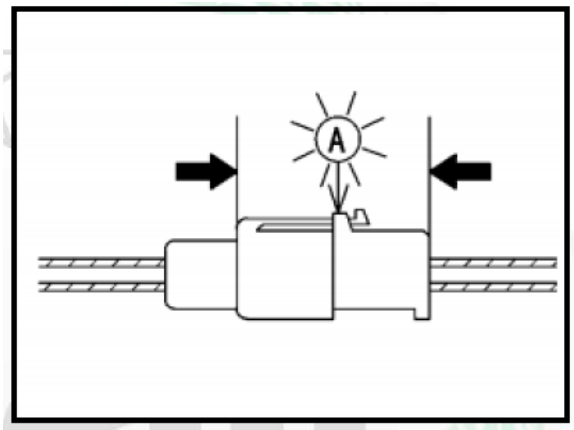
○Be careful not to cause short-circuit to the cable directly connecting the positive (+) terminal of the battery directly to the ground wire of frame.

○Disconnect the connecting wire between battery and motorcycle, so as to prevent damaging ECU due to high voltage.

○Turn off the main switch before disconnecting EFI electrical connection, and then disconnect battery (-). Do not pull the lead, and only pull the connector. Conversely, ensure that all EFI electrical connectors have been connected before starting the engine.

○Adapters are connected to power in right position.

○Do not turn the main switch on if any EFI electrical connectors are not connected.
ECU will remember the trouble code.



○Do not spill water on electrical parts, EFI parts, connectors, leads and wires.

○If a motorcycle is equipped with a transceiver, make sure that the radio wave sent from antenna will not interfere with the operation of EFI system. Make the engine in idling operation, and check the operation of system. Keep the antenna as far away from ECU as possible.

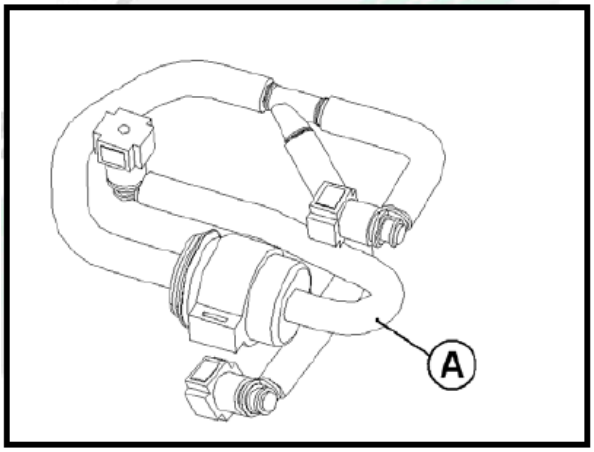
○Do not turn on the main switch when disconnecting any fuel hose. Otherwise, the Fuel pump will run, resulting in fuel discharged from the fuel hose.

○Do not run after Fuel pump is completely dry, to prevent Fuel pump from being stuck.

○Before disassembling parts of the fuel injection system, blow out any dirt or dust outside the parts with compressed air.

○When any fuel hose is disconnected, the fuel will be discharged due to the residual pressure in the pipe. Therefore, it needs to cover the hose joint with a clean cloth to, so as to avoid spilling fuel.

○When installing the hose, avoid bending, kinking, squeezing or twisting the hose excessively. Do not bend the hose as far as possible to avoid blocking the fuel passage



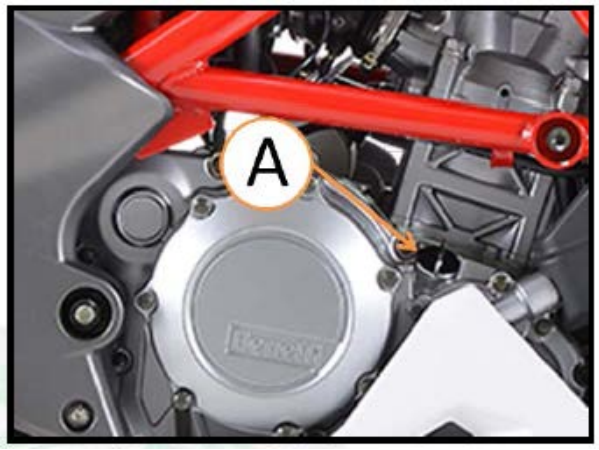
○Run the fuel hose according to the section “winding way of cable, wire and hose” in chapter “appendix”.

○Do not add any fuel antifreeze chemicals to the fuel so as not to corrode the fuel injection system or cause deposits in the fuel injection system.

○If the operation method is incorrect, the high pressure in the fuel hose may cause a fuel leakage or fuel hose [A] to burst. Bending and kinking is required when checking fuel hose.

★Replace the fuel hose if any damage or expansion is found!

○In order to maintain a correct mix of fuel and air (F / A), intake air leakage shall not occur in EFI system. Screw up oil filler plug [A] after adding oil.



The locking torque of oil filler plug: tighten it with hands.

ECU

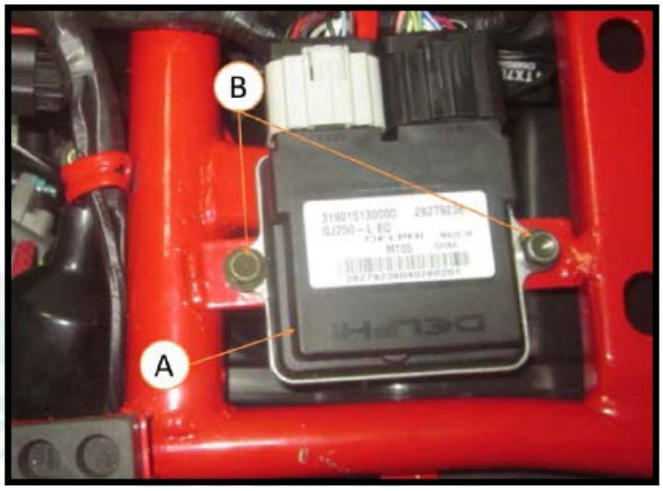
Engine controller (MT05 ECU)

The ECU can detect the running state of engine in real time through various kinds of sensors. Through reasonable calculation and self-learning control output device, it can ensure original vehicle emissions and fuel economy at the same time of optimizing the steering performance of vehicles under different conditions. The ECU can also perform self-diagnostics when the system is faulty.

ECU Appearance

The upper part of MT05 ECU shell is made of plastic, and the bottom is made of aluminum alloy. Fig. 2 is the front and back photos of MT05 ECU.

ECU Disassembly



•Disassemble front seat

• Disassemble

ECU [A]

Bolt [B]

ECU Installation

•Assemble it in reverse order of disassembly

Tightening bolt torque of ECU: 3.9N·m

⚠Warning
The installation surface must be flat, to prevent causing external stress to ECU, which may result in bending of ECU circuit board:

Notes for ECU

Notes	Cause
Do not: place ECU near exhaust pipe or engine	High temperature may reduce the service life of ECU and even directly damage ECU
Do not: place ECU near dripping water, oil or any liquid	ECU may be damaged due to liquid or other similar substances
Do not: cover ECU surface with mud or other pollutants	The cooling of ECU may be affected after being covered with mud or other pollutants
Do not: load extra voltage into ECU	It may cause problem to ECU performance, and even result in the damage of ECU.
Do not: clean ECU using the liquid with dissolution or corrosion effects	It may casue damage to ECU housing
Please: ensure that water or a large number of water vapor may not drip or be attached to ECU connector	Short-circuit may be caused to ECU connector and thus result in daamge to ECU
Please: clean ECU using a wet cloth and dry it	It may prevent ECU damage

ECU Power Supply Requirements

- ✧ Power supply: If the battery voltage is greater than 6.3V, ECU power supply module can start control chip, and this is automatically controlled by ECU.
- ✧ Power supply range: The ECU is capable of operating within the range of 9 to 16V for battery and ignition voltage.
- ✧ Shutdown: ECU will be shut down when the ignition voltage drops below 6.2V. ECU will enter shutdown program, to save the important information into ECU's memory.
- ✧ Restart: all outputs are set to a pre-set state during a restart. ECU will monitor itself in real time; when any internal error is detected, it will automatically enter the restart. ECU will be run according to the normal procedures at the end of restart.
- ✧ Overvoltage: permanent damage will not caused to ECU after working for 1 minute at a DC voltage of not exceeding 26 V.
- ✧ Reverse voltage: permanent damage will not caused to ECU after working for 1 minute at a reverse DC voltage of not exceeding 13 V.

ECU Temperature Requirements

Operating temperature: ECU can work normally at a ambient temperature of minus 20 degrees Celsius to 85 degrees Celsius.

Fuel pump

Fuel pump Working

Fuel pump assembly provides the fuel to engine with 250Kpa gasoline pressure to meet system requirements. It is installed at the bottom of tank to provide the required fuel to engine through the connecting pipes.

Fuel pump:

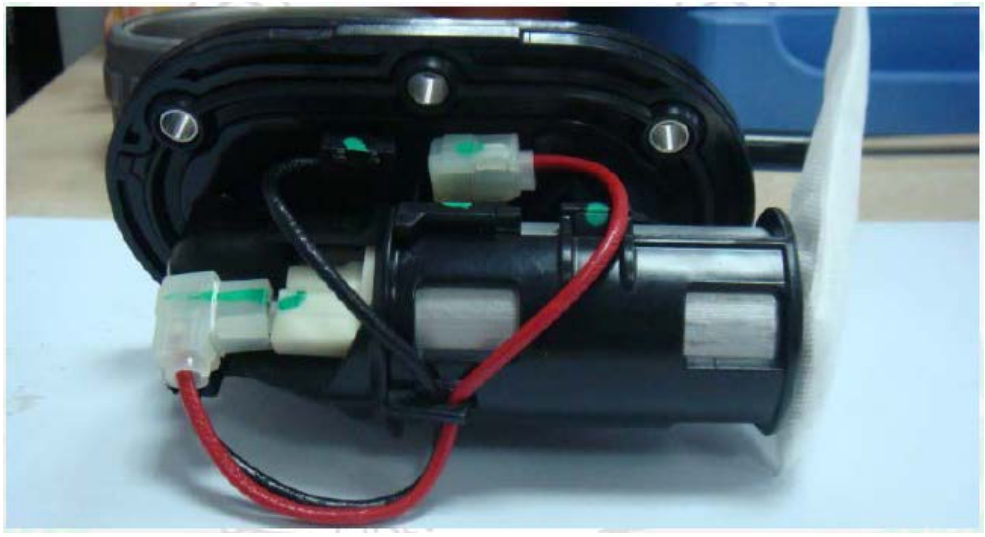
The electrical principle of electric fuel pump is that: when DC motor is driving the fuel pump with turbine-type structure to run, the fuel in the circumferential grooves of turbine rotor will move at a high speed with the turbine motor. Due to the centrifugal force generated by the high speed, the fuel pressure at the outlet is increased, meanwhile, the turbine in high speed rotation will generate a certain vacuum at the inlet of fuel pump, and thus fuel is sucked into the turbine blade space from the inlet. The differential pressure between the inlet and outlet may cause fuel to be sucked by the fuel pump to the outlet side and delivered to the fuel hose of system. The fuel delivery pressure generated by the fuel pump may be up to 250-400kPa.

Pressure regulator:

It is mechanical diaphragm type, and can be used to make pressure regulation to fuel pump device, so as to achieve the constant fuel pressure required by the system.

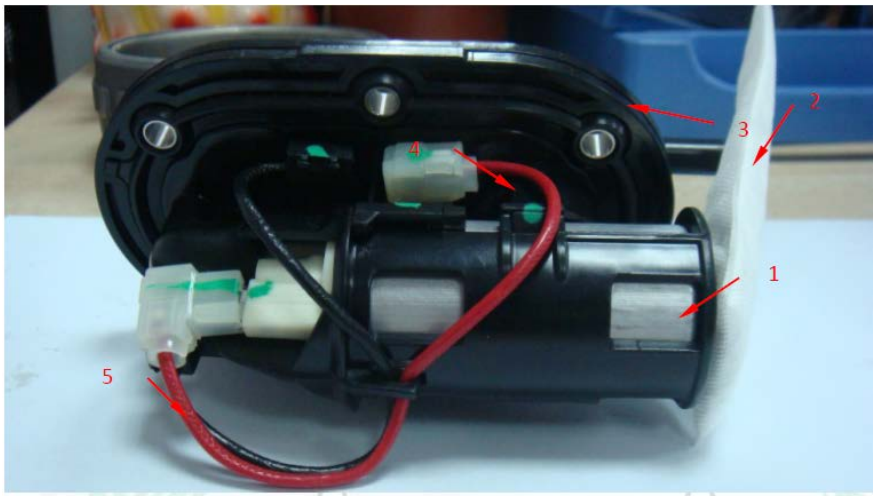
Fuel pump Appearance

Back side:



Front side

Fuel pump Composition



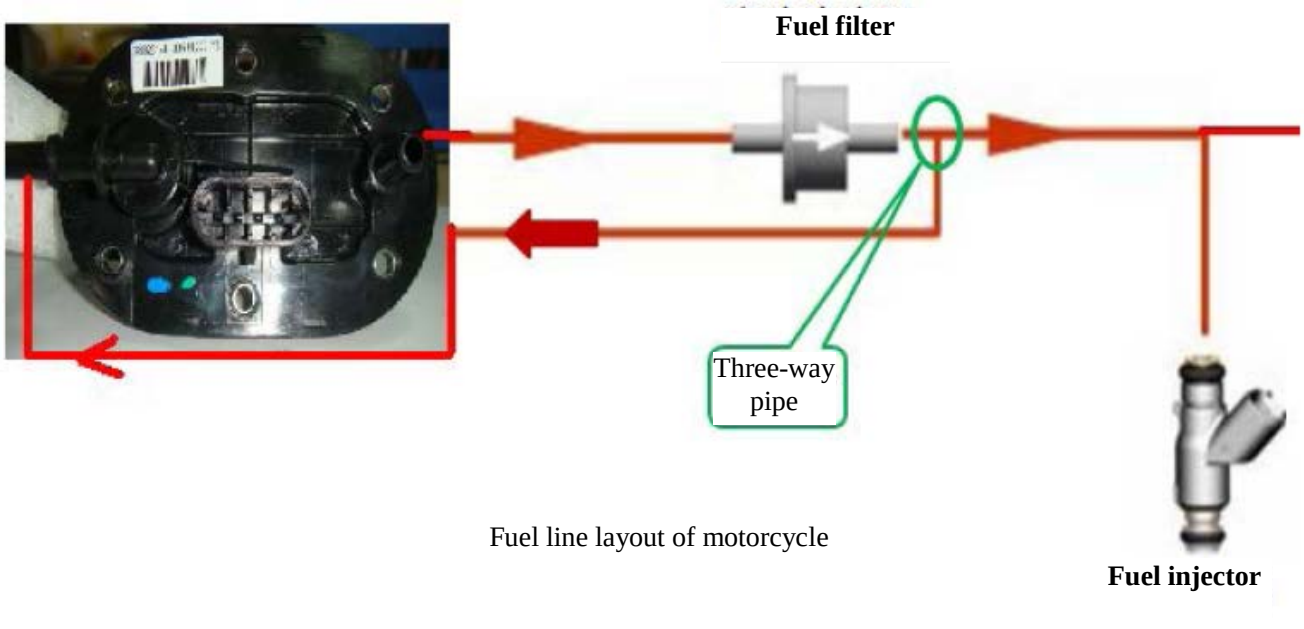
1. Fuel pump body
2. Filter
3. Sealing washer and fuel pump bracket
4. Pressure adjustor
5. Fuel pump harness

Fuel pump Label and Mark

Fuel pump assembly: make it at fuel pump assembly installing plate in the form of label.
Fuel pump: make engraved mark at fuel pump.
Oil pressure regulator: make engraved mark at external housing.

Working Environment of Fuel pump

- The fuel pump assembly needs to be installed at the bottom of fuel tank according to the requirements.
- Fuel pump assembly design is generally only for fuel, ethanol and fuel with gasoline ratio of 22%.
- Make sure that there is enough fuel in the fuel tank in the first operation of fuel pump assembly, and do not run it in the absence of fuel.
- Refer to the following figure for fuel hose connection method.



Fuel line layout of motorcycle

Fuel pump Maintenance Process:

Safety Protection:

When conducting maintenance operation for fuel system, care should be taken to ensure personal safety

- Disconnect the negative electrode of battery of motorcycle.
- Smoking is prohibited and a “no smoking” sign should be placed near the operating area.
- Ensure that there is a fire extinguishing device.
- The operating environment is well ventilated and away from open flames.
- Wear safety goggles.
- To release fuel vapors in the fuel tank, open tank cover and refit it.
- There is still a high pressure in the fuel line after the engine stops running, then oil may be injected after disassembling or releasing fuel line. Refer to “Fuel Pressure Release Process” in this section.
- A small amount of fuel may flow out after disassembling fuel line, in order to avoid the risk of occurrence, the blocking device at the fuel hose should be used for blockage.
- After maintenance is completed, please ensure that the fuel line and clamp are properly installed.
- After maintenance is completed, check fuel leakage according to the provisions of “Fuel Leakage Check Process”.
- After maintenance is completed, connect the netative electrode of battery, please ensure that there is sufficient fuel in the fuel tank when the fuel pump is running.

Fault Diagnosis of Fuel Pump Assembly:

Step	Operation	Yes	No
1	After ingnition key is started, fuel pump will run for 3 seconds.	If you can hear that the fuel pump is running, please go to Step 4 directly.	If you cannot hear that the fuel pump is running, please conduct Step 2.
2	Disconnect the connector of fuel pump, and check whether the supply voltage of fuel pump is within the range of 10-14V	Conduct Step 3	Check the power supply circuit of fuel pump
3	Supply 12V DC current to fuel pump. Ensure that there is sufficient fuel in the tank, to prevent dry running of fuel pump Is fuel pump running?	1. Check the circuit from fuel pump to ECU 2. Check ECU	1. Check fuel pump harness 2. Check fuel pump
.4	Check whether the front fuel supply pressure of nozzle is within the range of 220-270kpa when engine is in idle running.	Fuel pump assembly is running normally	Conduct Step 5
5	Detect whehter fuel hose way pressure is less than 220kpa using oil pressure gauge.	1. Check whether there is leakage at fuel hose joint 2. Check fuel pump position 3. Check pressure regulator	1. Check whether the fuel filter is blocked 2. Check whether fuel hose is bent and twisted 3. Check pressure regulator

Disassembly of Fuel Pump Assembly:

- Refer to “Fuel Pressure Release Process” to release the fuel pressure in the fuel line.
- Disconnect the negative electrode line of battery.
- Disconnect fuel pump assembly harness connector.
- Remove the remaining fuel from the fuel tank and store it in a suitable container, to ensure safety and reduce contamination.
- Remove the fuel tank from the motorcycle.
- Invert the fuel tank, be careful to avoid tank scratches and bumps.
- Remove fuel pump assembly installing bolt.
- Remove fuel pump assembly from the fuel tank carefully.
- Be careful to not damage fuel pump filter

Installation of Fuel Pump Assembly:

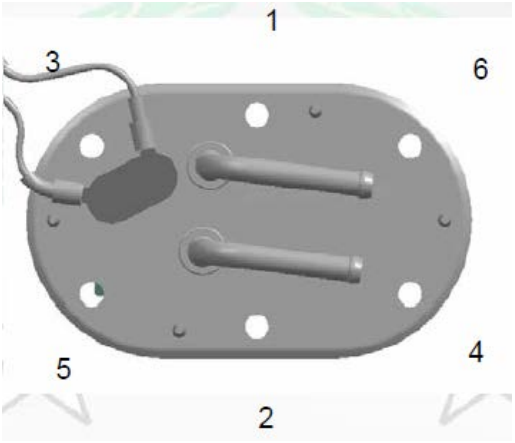
- Replace the sealing washer of fuel pump assembly. (Used washer may lead to fuel leakage)
- Gently hold the fuel pump filter and put fuel pump assembly into the fuel tank. Avoid damaging fuel pump filter.

  Installation direction of fuel pump assembly: the installing screw holes of fuel pump assembly are not arranged asymmetrically, and they can be installed in the specified direction. The pressure regulator should

face the rear of fuel tank, and ensure that the installing surface of fuel tank is clean and flat.

- Install mounting bolts on the fuel pump assembly cover and tighten them evenly in the order indicated in the following figure. Installing torque of screw: 3- 4 Nm.

  The fuel pump assembly should be secured with special bolts. It should be tightened according to specified tightening order and torque during the installation. Over torque and incorrect tightening order may cause washer deformation and thus result in leakage.
- Install the fuel tank onto the motorcycle.
- Connect fuel hose and fix it with a suitable clamp.
- Connect the fuel pump harness connector.
- Check for leaks according to “Fuel Leakage Check Process”.



Tightening order of installing screws

Fuel Pressure Release Process:

Note: Do not operate when the engine is in warning-up state.

After confirming that the engine is in cooling state, conduct the following fuel pressure release operation:

- The motorcycle is in “neutral” state.
- Disconnect the connector between fuel pump assembly harness and motorcycle harness.
- Turn on motor to start engine until the engine is automatically extinguished. Then continuously turn on and off the ignition key for 2-3 times,with an internval of 3 seconds each time.
- After completing the above operations, connect the fuel pump assembly harness connector.

Fuel Leakage Check Process:

After performing any fuel system maintenance, perform fuel leakage check test

- Fill the tank with sufficient fuel.
- Turn on ignition key for 3 seconds, and then turn off it for 15 seconds, repeat the above operations for 3-4 times, to establish the oil pressure in the fuel line.
- Check whether there is leakage in the parts of fuel system (fuel tank, connecting pipes, pipe joint, etc.).

Notes for Use:

Notes	Cause
Do not: throw or knock fuel pump	It may cause damage to the internal of fuel pump
Do not: fuel pump is “running in dry state” (there is no fuel at fuel pump inlet and filter) Please ensure that there is sufficient fuel in the tank	It may cause damage to the internal of fuel pump
Do not: damage filter during the maintenance	Impurities may go into the fuel pump from damaged filter and thus damage the fuel pump body
Do not: disassemble the internal parts of fuel pump and pressure regulator Do not: regulate fuel pump and pressure adjustor (except replacement)	Warranty will not be provided in the case of unauthorized disasembly
Do not: pull fuel pump harness	Harness is damaged / the power supply of fuel pump is disconnected

Do not: use damaged pipe clamp	Pressure leakage / fuel leakage
Do not: use seriously damaged fuel pump filter or cut fuel pump assembly	Impurities may go into the fuel pump from damaged filter and thus damage the fuel pump body
Do not: fuel pump fuel from fuel tank	Fuel pump is not designed for this purpose
Do not: Install screws to fix other parts using fuel pump assembly	Affect fuel pump assembly installation
Do not: damage fuel pump harness during the maintenance of fuel pump assembly	Damaged terminal may cause poor contact / the power supply of fuel pump is disconnected
Do not: contact fuel pump assembly when pumping fuel from the tank manually	Avoid damaging fuel pump assembly
Please: ensure that the tank is not damaged during maintenance	Avoid oil leakage
Please: only use “genuine” fuel pump assembly sealing washer	Counterfeits may cause fuel leakage
Please: use designated hose clamp	Ensure that there is no fuel leakage and seepage at pipe joint
Please: fix fuel pump harness at motorcycle	Reduce shock
Please: use standard fuel	The fuel with poor quality may damage the fuel pump too early
Please: replace fuel filter within the specified time	Blocked filter may reduce fuel supply
Please: use specified and qualified fuel filter	Unqualified filter may damage nozzle, oil pressure regulator and fuel pump
Please:esnure to correctly arrange the ways of fuel hoses and not interfere with other parts	Incorrect ways and interference may damage fuel hose
Please: ensure that there is sufficient fuel in the tank (submerge fuel pump filter)	Avoid “running in dry state” of fuel pump
Please: during the presure regulator maintenance, replace two O rings simultaneously	Ensure the correct pressure regulation curve of pressure regulator
Please: take care to connect fuel pump assembly harness connector	Avoid damaging the terminal of connector
Please: return any collided , damaged and suspicious parts and describe the problems	Ensure to quickly and correctly find the root cause of problem

Warning:

- Because there is no gasoline in the fuel tank of new motorcycle at the beginning, a lot of air is generated at fuel hose, so it needs to start it for several times to bleed the air in the fuel line, and then the engine can work properly, which is normal. Motorcycle will be started easily in the future.
- Because gasoline can cool fuel pump, do not let fuel pump work little gasoline or no gasoline, which may burn fuel pump.

Throttle Body

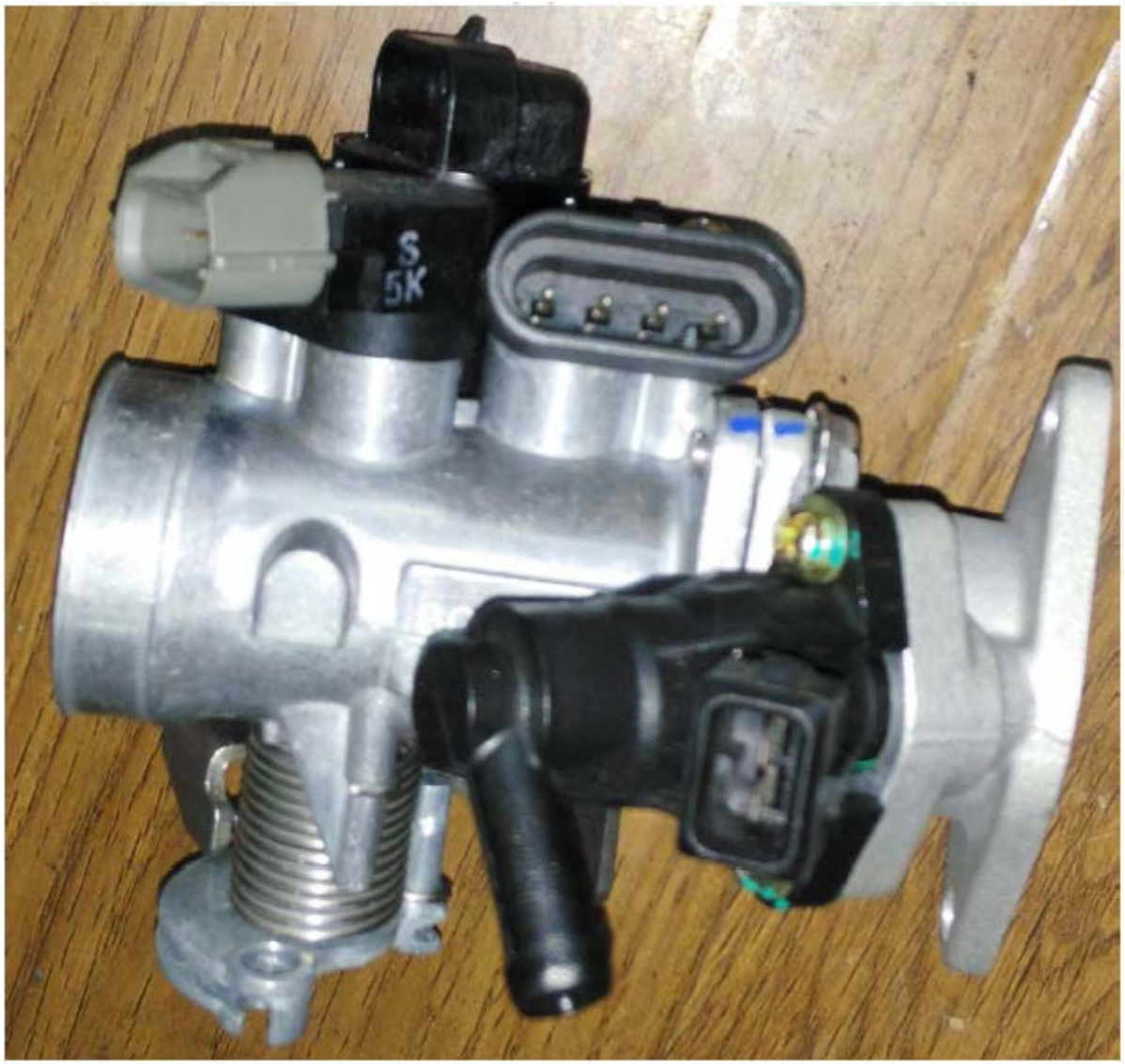
Working Principle of Throttle Body

Throttle body assembly mainly consists of the following components: main casting valve, bearing, shaft and valve plate, return spring, throttle wire part, throttle position sensor system, and bypass screws control system. All of the above subsystems work together to meet the requirements for following functions:

- ✧ Intake air flow control
- ✧ Idle air flow control
- ✧ Throttle position detection – provide throttle opening feedback signal for engine control system

Throttle position sensor provides ECU with throttle opening; the stepper motor at throttle body maintains the idle speed of engine near the target idle speed required by ECU;

Appearance of Throttle Body:



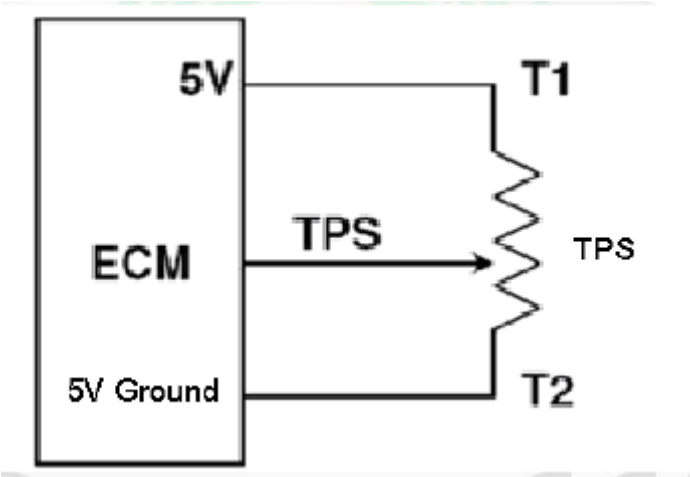
Technical Parameters

Throttle Body:

- ✧ 34mm inner diameter: maximum flow: ≥50g/s@2.7kPa vacuum degree
- ✧ Breakaway torque of throttle body:
  Idle speed state: 0.12±0.03Nm
  Full opening: 0.32±0.05Nm

Throttle Position Sensor:

- ✧ Reference voltage: 5±0.1VDC
- ✧ Resistance between T1 and T2: 3k-12kΩ



Idle Air Control Valve:

- Working voltage: 7.5-14.2VDC
- Winding resistance: 53Ω±10%
- Winding inductance

Working Environment of Throttle

Normal working temperature: -30-120°C

Disassembly of Throttle

- Disconnect the negative electrode connection of battery
- Disconnect the connectors of throttle position sensor, stepper motor, intake air temperature / pressure sensor (if it has been installed at throttle assembly)
- Remove throttle wire
- Remove the hose connected with air filter and intake air manifold

Cleaning Method of Throttle

Clean throttle body using carburetor cleaner (3M product is recommended). Spray cleaner at the inner wall of throttle body, and gently remove dust and carbon deposit and other items using a brush. Be careful to prevent the bypass screws from being blocked by dirt.

Installation of Throttle

Note the following items for the steps to install throttle body:

- ✧ Adjust throttle wire
- ✧ Ensure that all moved parts have been installed in place, such as stepper motor assembly
- ✧ Install connection screw

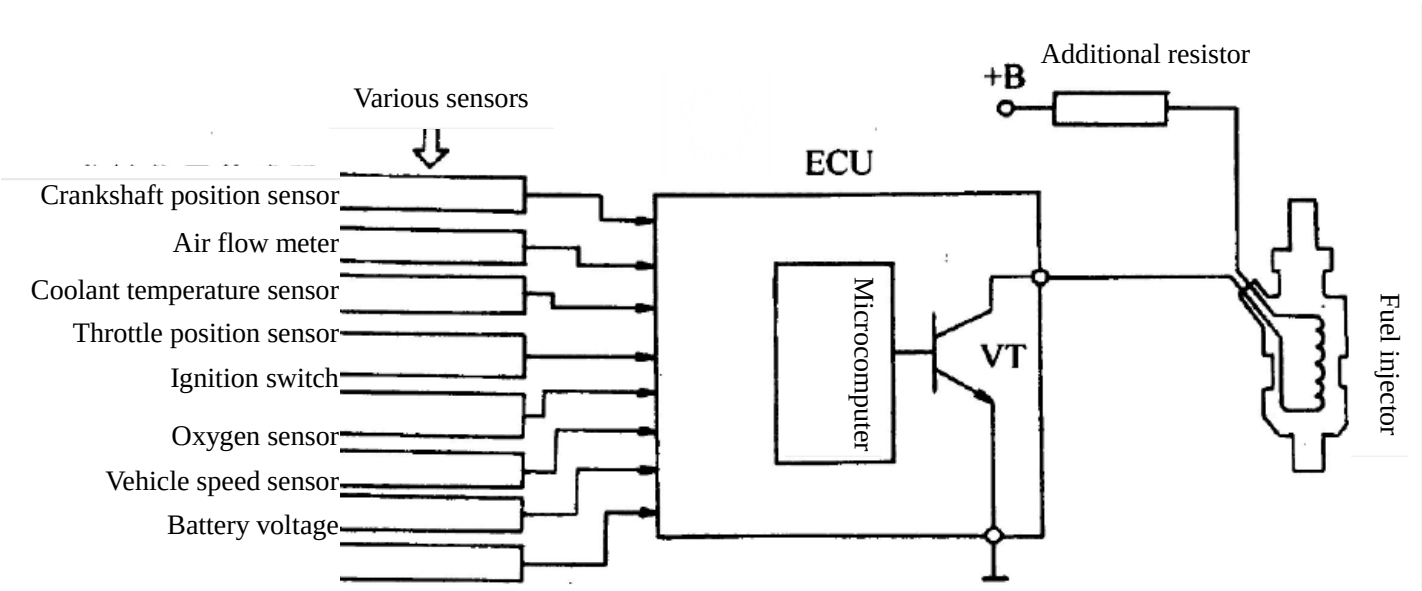
Precautions for Installation of Throttle

- ✧ Do not immerse the throttle position sensor into liquid.
- ✧ Always open the valve plate using throttle wire.
- ✧ Do not put tools or other items inside the throttle body to maintain the opening of valve plate. This may result in deformation of valve plate or scratching of inner wall of throttle body. Such damage may cause the valve plate to be too easily opened or difficultly.

Notes for Use of Throttle Valve

Notes	Cause
Please: be caureful to install the connectors of all throttle body	Avoid the damage to the terminal
Please: avoid any liquid from entering throttle body	Make sure it works properly
Please: take one throttle body from the part tray and install it	Avoid damage to key components
Please: return the dropped, damaged or suspected parts and label them to describe the existing problems (only for three packs of components)	Quickly identify the cause of problem
Do not: use any dropped or squeezed parts	May cause damage to the internal of parts
Do not: store or transport it near salt water in unprotected conditions	Corrosion may affect normal use
Do not: expose it to the environment before the completion of assembly (such as humid environment)	Corrosion may affect normal use
Do not: test it using non-system operating voltage	May cause damage
Do not: use extra clamps	May cause damage
Do not: remove the packaging so that the parts can touch each other	May affect minimum air leakage or cause other damage
Do not: release the throttle completely from any position	May cause damage
Do not: block bypass with dust or small particles	This may affect idle speed stability
Do not: pick up, store or hold parts in a manner that might come into contact with other parts.	May cause damage

Fuel injector



Working Principle of Fuel Injector

Injector is an actuator. It can inject appropriate fuel into the intake air of engine through ECU and then suck it into combustion chamber and then mix it with the oxygen in the fresh air filled for combustion.

Only replace it with the fuel injector with the same part number.

Appearance of Fuel Injector

The following figure shows the appearance of fuel injector.

Sealing Ring of Fuel Injector

As shown above, O-ring seal can ensure that leakage will not occur when fuel injector works within the range of -40°C -150°C (-40 -302°F), and it can resist various fuel additives (such as: ethyl alcohol). The following data is the existing sealing ring design.

O-ring Seal Connected to fuel Rail or fuel Injection Cap

•Dimensions:
- •Inner diameter: 6.35 mm
- •Outer diameter: 14.85 mm
- •Section thickness: 4.25 mm

•Material
- •Viton□GLT (blue): application at low temperature
- •Viton□A(black): except the application at low temperature

O-ring Seal Connected to Intake Air Pipe End

•Dimensions:
- •Inner diameter: 9.61mm
- •Outer diameter: 14.49 mm
- •Section thickness: 2.44 mm

•Material
- •Viton A (blue or brown)

Recommended Lubricant

To facilitate the installation of fuel injector, lubricant should be applied on O-ring seal. The following table shows the list of usable lubricants. Tests show that the following lubricants do not have any impact on the fuel injector.

List of recommended lubricants		
Name of lubricant	**Manufacturer**	**Viscosity (cSt) @ 40 °C**
Spindura 10	Equilon	L0
Spindura 22	Equilon	21
DTE-24	Mobil	3 2
DTE-25	Mobil	46
DTE-26	Mobil	68
Norpar 15	Exxon / Mobil	1
Drawsol 60	DA Stewart	1-2
NocoLube AW 46	NOCO Energy	46
NocoLube AW 32	NOCO Energy	32
Advantage Spindle Oil	Advantage Lubrication Specialties	10

Overvoltage Impact of Fuel Injector

The fuel injector can run at the voltage of 26V and the working conditions of 100ms (pulse) and 200ms (one cycle time) for 1 minute at most (run with oil). It will not affect the flow rate, cause permanent damage to the solenoid coil or weaken the electromagnetic performance.

Temperature Range of Fuel Injector:

The standard injector operating temperature range is as follows. Within the qualified operating temperature range, the fuel injector flow is within the tolerance range and fault will not be caused. At the same time, in a reasonable working environment, leakage, degradation or reduction of service life will not be caused to fuel injector.

- ✧ Operating temperature range: -30 -125°C
- ✧ Extreme operating range (may cause some functional degradation): - 40-150°C
- ✧ Storage temperature: -60 -60°C

Fuel Contaminants of Fuel Injector

Although the injector has a self-cleaning function, it is not a serviceable part, because it is designed to remove only the impurities with small diameter accumulated in the fuel line from the fuel filter to the injector. The impurities with large diameter may cause injector clogging, flow deviation and leakage and other faults, so fuel filter system is very important.

Fuel Injector Harness Arrangement

- ✧ The injector harness should be located away from heat sources and the harness should be protected from external wear or damage.
- ✧ If not necessary, do not insert or remove the injector connector.
- ✧ The electrical pins of fuel injector do not have positive and negative electrodes.

Notes for Use of Fuel Injector

Notes	Cause
Do not: resuse the seal; if it needs to reuse it in special conditions, please carefully check whether the sealing ring is damaged before use.	Avoid leakage
Do not: immerse the end of nozzle in the lubricant.	It may block spray hole.
Do not: run it without load in the case of no fuel pressure	It may damage internal mechanical components.
Do not: make water go into the fuel during leakage inspection.	It may damage fuel injector.
Do not: apply force to the head of fuel injector during installation	During the installation on nylon intake air pipe, allow to apply force in the direction of 45 degrees
Do not: Strike fuel injector when installing it at intake air pipe.	It may cause fuel injector and sealing ring.
Do not: apply tension to connector.	It may cause intermittent power supply.
Do not: use dropped fuel injector.	It may be damaged.
Do not: store fuel injector, fuel rail or engine that has been loaded into fuel injector in an unprotected environment.	External environment may damage the electronic and mechanical parts of fuel injector.
Do not: take fuel injector as a handle when lifting assebly parts.	It may damage fuel injector.
Do not: parts touch each other during storage.	It may damage fuel injector.
Do not: parts touch each other during transportation.	Collision may be caused and thus fuel injector may be damaged.
Do not: knock fuel injector for troubleshooting when an fault occurs.	It may damage fuel injector.
Do not: repalce the original fuel injector with one with the part number not recommended.	It may seriously affect the performance of nozzle.
Please: pay special attention to protect sealing ring from being cut by the installing seal during the installation of fuel injector	Protect sealing ring.
Please: Use correct lubricant for installation, and applyit into the installing hole immediately	Protect sealing ring, to reduce pollution.
Please: tests if the fuel injector needle valve is stuck or cannot be mounted. (Apply the pulse to fuel injector for less than 5 seconds using 9-15 V voltage).	Confirm the fault form of fuel injector
Please: before assembling fuel injector, make an fuel-free leak test to confirm that the needle valve of fuel injector has been mounted.	It may prevent the needle valve of fuel injector froming returning to the original position during the transporation and transfer process, thus resulting in fuel leakage.
Please: prevent liquid from damaging fuel injector.	It may casue short circuit of solenoid coil.
Please: be careful to disassemble harness.	It may cause damage of terminal.
Please: use recommended lubricant when installing connector.	It may cause corrosion to terminal.
Please: do not use the components that are dropped, damaged or whose materials have problem, and describe the problem with label.	Ensure to quickly find the root cause of fault.

Requirements for Installation of Fuel Injector

During the installation and removal process, please strictly observe the following methods to avoid damage to the fuel injector body and electronic components.

- ✧ Lubrication: Apply a small amount of lubricant to the underside of the sealing ring. ISO 10 light mineral fuel or equivalent product is recommended.
- ✧ When conditions allow, apply lubricant to the fuel injector seat, which is better than the effect of being applied the seal ring. So that the fuel injector contamination probability will be reduced to minimum.
- ✧ Do not allow the spray plate to come into contact with the lubricant, which may affect the injection quantity. Do not dip the top of the fuel injector to into the lubricant.
- ✧ All fuel injector sealing rings are factory assembled. In principle, the sealing seals should not be reused. In the case of being resued in special conditions, please carefully check the sealing rings for damage. Very small damage may cause leakage. Carefully insert the sealing ring into the installing seat during installation.
- ✧ When installing the fuel injector connector, take care not to damage the connector, and you can hear a click, indicating that it is in place.
- ✧ Avoid unnecessary disassembly and assembly of connector.
- ✧ Harness should not be clamped too tightly, which may cause a short circuit.
- ✧ When installing the fuel injector connector, do not rotate the fuel injector. This may cause fuel injection target deviation
- ✧ **Replacement Method of Fuel Injector**

The following is the disassembly and replacement method of fuel injector.

Note: The injector and the surrounding objects are very hot.

- ✧ Turn off the motorcycle.
- ✧ Cut off the negative electrode of battery, to avoid accidentally starting the engine.
- ✧ Remove the fuel injector connector.
- ✧ Release the fuel pressure.
- ✧ Remove the fuel hose from the fuel injector.
- ✧ Remove the fuel injector from the throttle body.
- ✧ Remove the fuel injector retainer and carefully remove the fuel injector from the seat ring.
- ✧ Carefully clean the impurities at the injector contact surface, and be careful not to damage the contact surface.
- ✧ Apply lubricant to the sealing rings on both ends of the new fuel injector.
- ✧ Carefully put the head of fuel injector into the intake air pipe, and confirm that the installation direction is consistent with the original one.
- ✧ Press it in the fuel injector seat ring and secure the clamp.
- ✧ Install fuel injection pipe.
- ✧ Insert the fuel injector connector.
- ✧ Power on the main switch, do not start the engine and check if fuel injector was leakage.
- ✧ Start engine for running check.

Injector Replaceability

Only allow to replace the fuel injector with genius parts

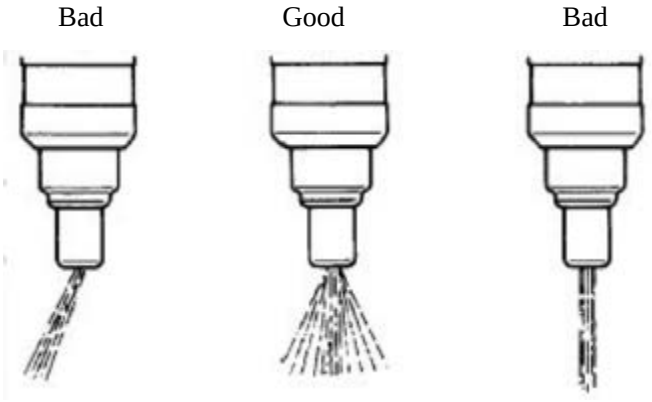
Blocking of Fue Injector

The accumulation of fuel impurities may cause flow offset and shorten fuel injector life. When the engine is standing, the heat of engine may produce fuel precipitation through the head of fuel injector, and the precipitation gathered in the injection hole may cause flow offset.

- ✧ Blockage may cause many problems, such as small flow, large friction and accumulation of impurities, and ultimately affect emissions and durability.
- ✧ Fuel and environmental factors may cause fuel crystallisation or fuel injector corrosion, which may also cause flow offset.
- ✧ Poor oxidation stability of fuel may cause precipitation, so please use high-quality gasoline.
- ✧ Add an appropriate amount of fuel cleaner to avoid precipitation.
- ✧ If fuel injector is blocked, please clean injector according to the following cleaning method.

Warning:

- The injector is internally designed with a filter, but it is not a serviceable part because it is designed to filter out only the accumulated impurities between the fuel filter and the fuel injector in the fuel line, and these impurities may cause fuel injector bonding, flow offset and leakage and other faults, so the fuel filter is very important.
- It can be replaced with the fuel injector with the same part number.



Atomization of fuel injector

Engine Temperature Sensor

- Working principle of engine temperature sensor

This sensor is used for coolant-cooled engine to measure the temperature at coolant passage of engine, installed at engine cylinder. Within the temperature range of this sensor, its resistance may vary with engine temperature. Its characteristic is the negative temperature coefficient resistance characteristic. It is a non-serviceable part.

- Installation requirements for engine temperature sensor
  - ✧ Dynamic torque requirements: should first assemble it with hands to correctly screw the threads, and tighten it to the specified torque with a wrench.
  - ✧ Static torque requirements: The torque required to remove the sensor from the engine should not exceed 200% of the assembly torque.

The assembly torque is as follows: 20-25N·m

- Working environment of engine temperature sensor
  - ✧ The sensor is mainly used for coolant-cooled engine
  - ✧ Normal operating temperature range: -40 -135°C (continuous work)
  - ✧ Working environment relative humidity: 0 ~ 100%
  - ✧ Typical operating pressure: at minimum installation torque, the sensor is capable of sealing the engine coolant at an actual pressure of 206.8 kPa (30 psi) and a temperature of 135°C.
  - ✧ Extreme working conditions: only 1 hour at maximum temperature of 150°C.
- Electrical environment of engine temperature sensor
  - ✧ Typical operating voltage: the reference voltage is 5 ± 0.1V DC
- Cleaning of engine temperature sensor
  - If necessary, the sensor can be cleaned with isopropyl alcohol and then air dried. It should be soaked in isopropyl alcohol for not more than 1 minute, and sealing connector should be installed during cleaning to prevent cleaner from intruding into the inside of sensor.

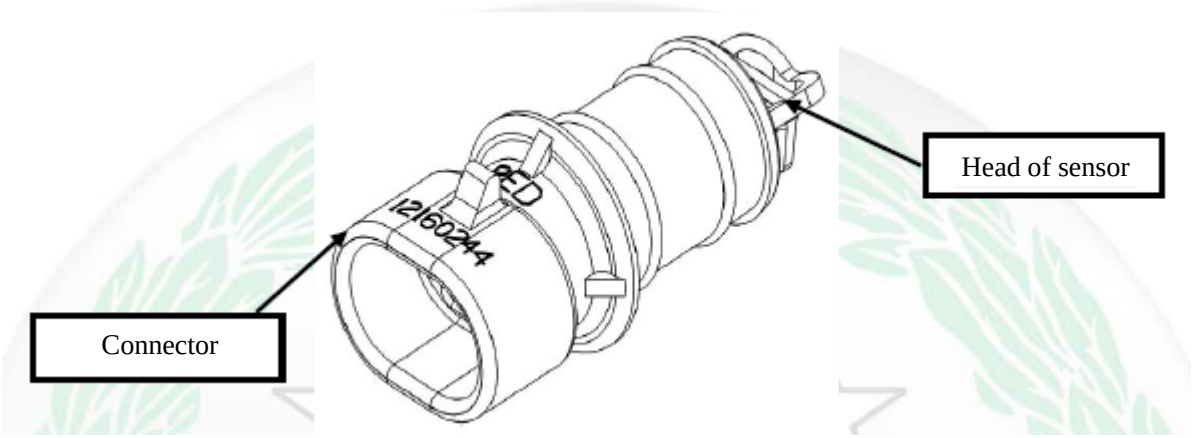
Intake Air Temperature Sensor

- Working principle of intake air temperature sensor

Within the temperature range of the sensor, its resistance may vary with the engine temperature, its characteristic is negative temperature coefficient resistance characteristic. It is a non-serviceable part.

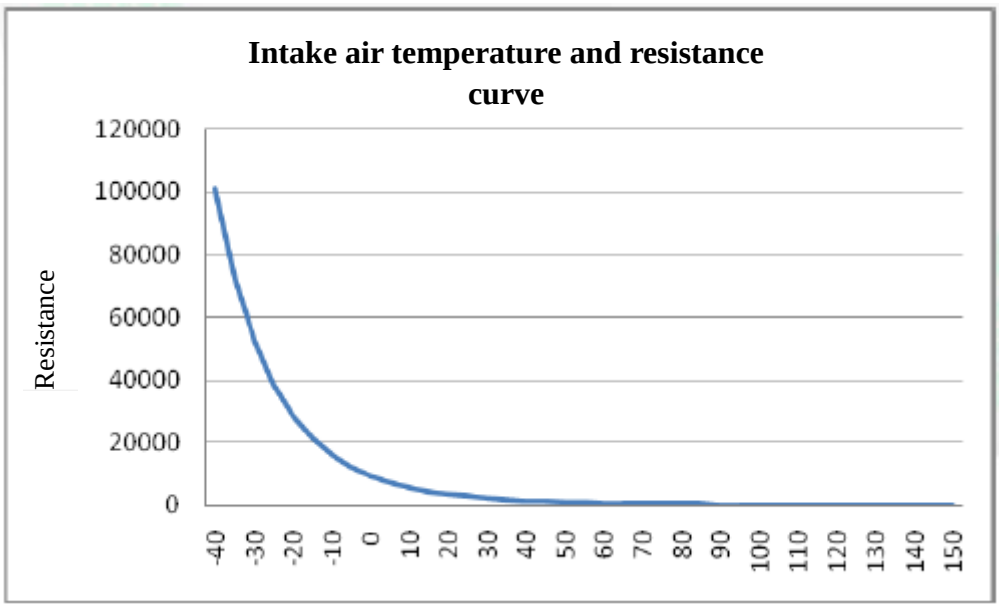
- Intake air temperature sensor appearance

The appearance of the intake air temperature sensor is shown below

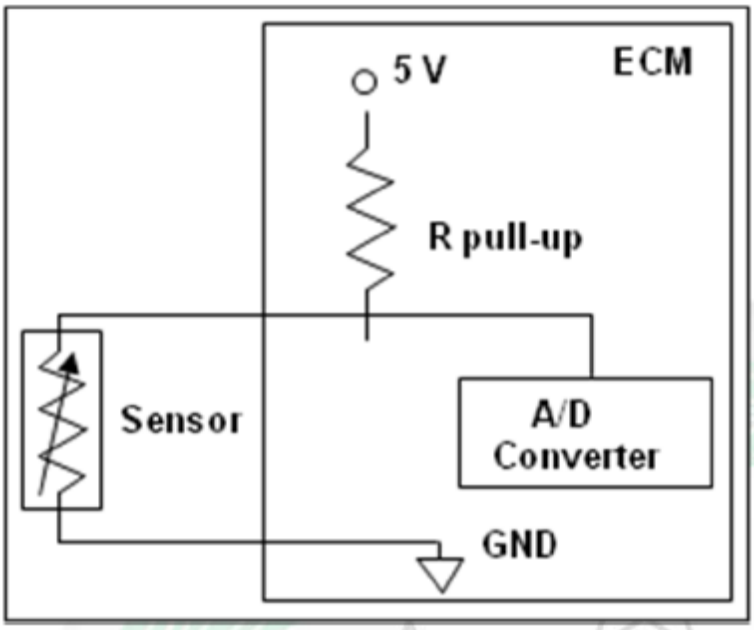


- Techncial parameters
  - ✧ Working voltage: 5VDC
  - ✧ Response time: ＜15s
  - ✧ Operating temperature: -40-150°C
  - ✧ Relative humidity: 0-100% RH.

Resistance measuring value and temperature curve:



•Pin definition and function drawing



Measure the resistance between two pins of sensor using multimeter. The specific temperature and resistance correspondence table is as follows:

Measured temperature (degree centigrade)	Resistance value (Ohm）
0	9,399
5	7,263
10	5,658
15	4,441
20	3,511
25	2,795
30	2,240

Intake air temperature sensor is at air filter, and it can be removed after wearing gloves.

- Cleaning

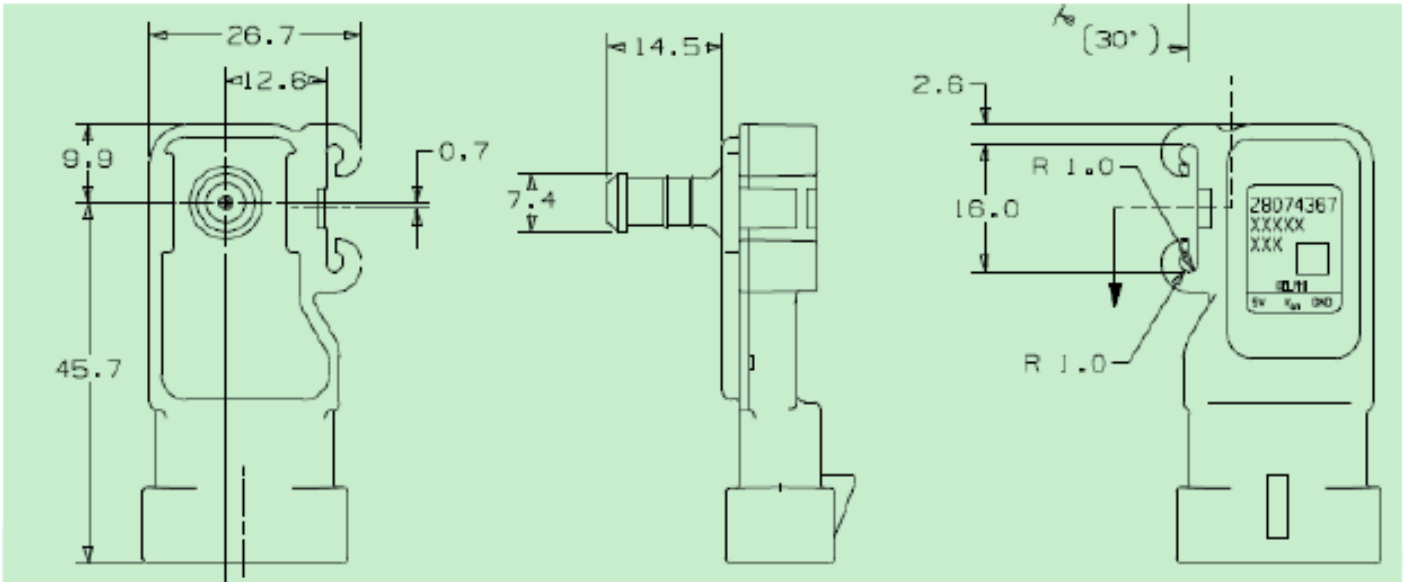
If necessary, the sensor can be cleaned with isopropyl alcohol and then air dried. It should be soaked in isopropyl alcohol for not more than 1 minute, and sealing connector should be installed during cleaning to prevent cleaner from intruding into the inside of sensor.

Manifold Absolute Pressure Sensor

•Working principle of manifold absolute pressure sensor

This sensor is used to measure the absolute pressure of air intake manifold, reflect the intake air pressure according to the difference of resistance, and then calculate the intake air volume in engine combustion chamber through indirect conversion, and it is also a non-serviceable part.

•Appearance of manifold absolute pressure sensor



•Working environment

- ✧ Working pressure range: 20-102kPa
- ✧ Working temperature range: -40-105°C
- ✧ Relative humidity: 0 -100% RH.
- ✧ Extreme operating environment: work for 2 hours at the maximum temperature of 125°C

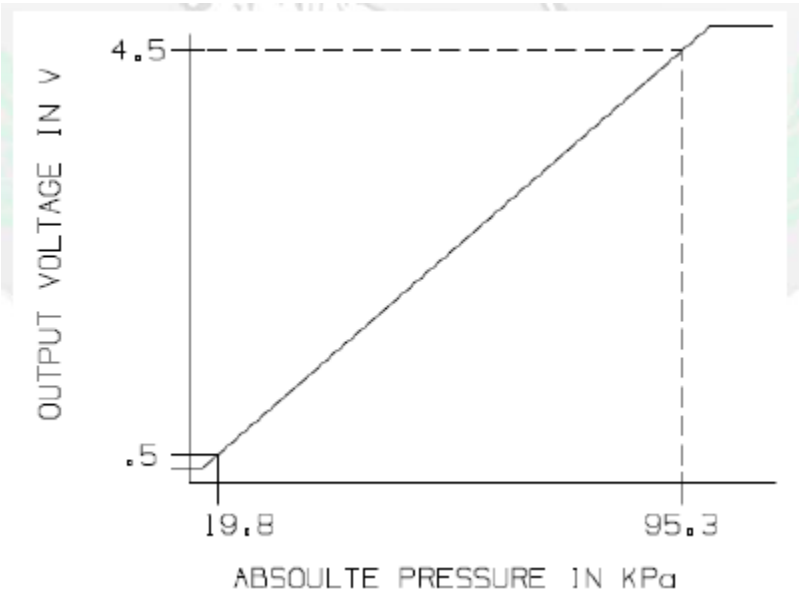
•Storage environment

- ✧ Storage temperature: -50°C-150°C

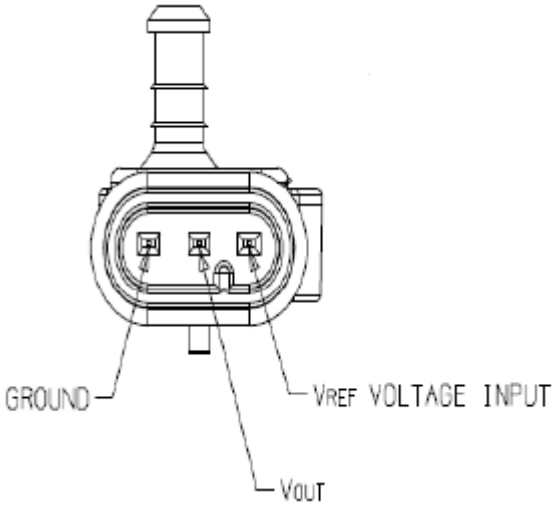
•Electric environment

Typical voltage: DC reference voltage of operating sensor circuit is 5±0.1V.

Characteristic curve



•Pin definition



•Position

Manifold absolute pressure sensor is integrated at throttle body

•Cleaning

If necessary, the sensor can be cleaned with isopropyl alcohol and then air dried. It should be soaked in isopropyl alcohol for not more than 1 minute, and sealing connector should be installed during cleaning to prevent cleaner from intruding into the inside of sensor.

Oxygen Sensor

•Working principle of oxygen sensor

Oxygen sensor can be used to detect the oxygen content in the waste gas of engine exhaust pipe for internal fuel closed loop control of ECU, thus maintaining engine combustion at the most reasonable state of air and fuel ratio.

•Appearance of oxygen sensor

•Technical parameters

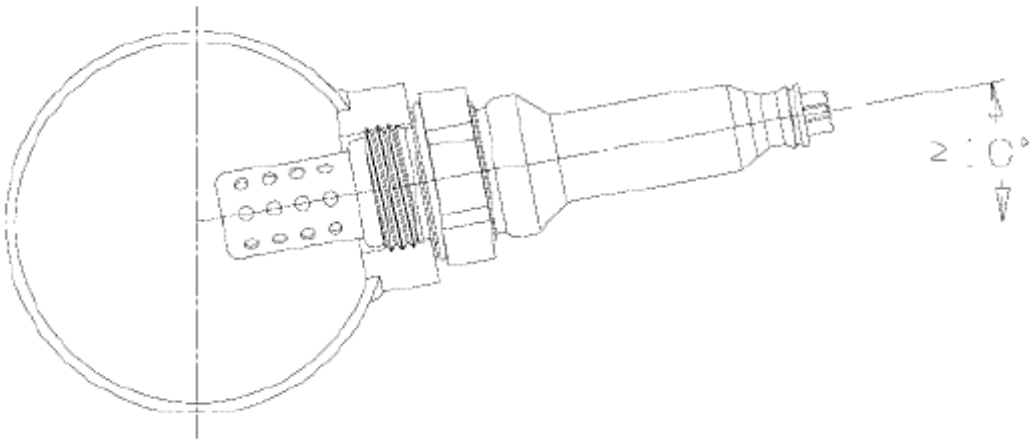
- ✧ Partially thick limit of air-fuel ratio: ＞750 Mvdc
- ✧ Partially thin limit of air-fuel ratio: ＜120 Mvdc
- ✧ Power of oxygen sensor heater: 7.0W

(The above parameters are measured at engine bench, the working conditions: exhaust gas temperature: 450°C; duty cycle: 70%; 10Hz; voltage: 13.5V).

- ✧ The resistance of heater is: 9.6±1.5Ω (measured at 21°C)
- ✧ Operating temperature range: 260-850°C

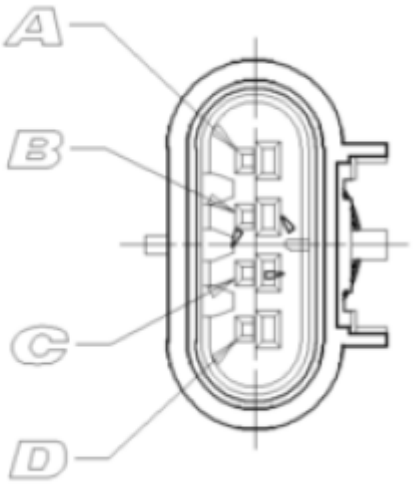
•Installation requirements

- ✧ Installation angle (angle with the horizontal plane): ≥10 degrees

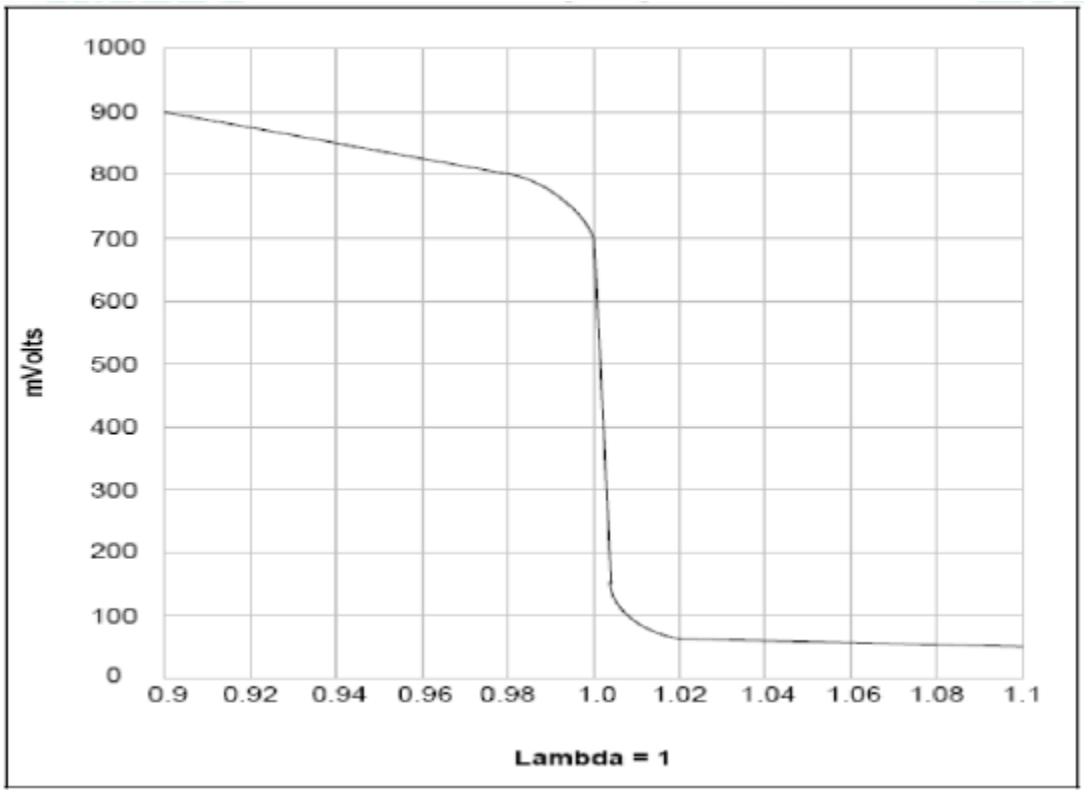


•Oxygen sensor pin definition

CONNECTOR PIN	WIRE COLOR	PIN AND WIRE CONNECTION
A	PURPLE	HEATER +
B	WHITE	HEATER -
C	GRAY	SENSOR (OUTPUT)
D	BLACK	SENSOR (GROUND)



•Characteristic curve

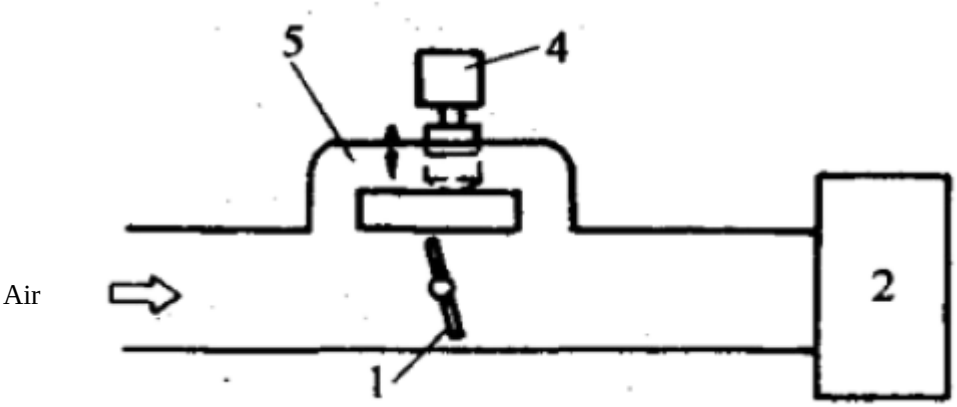


Oxygen sensor is at exhaust manifold. Please first pull up oxygen sensor plug-in, and then remove the oxygen sensor with 13# open spanner, and pay attention to not knot or clinch the harness.

•Requirements for fuel quality

- ☐ Pb□0.005g/L
- ☐ P□0.0002g/L
- ☐ S□0.04% (weight ratio)x
- ☐ MMT□0.0085g/L
- ☐ Si□4ppm

Idle Speed Stepper Motor

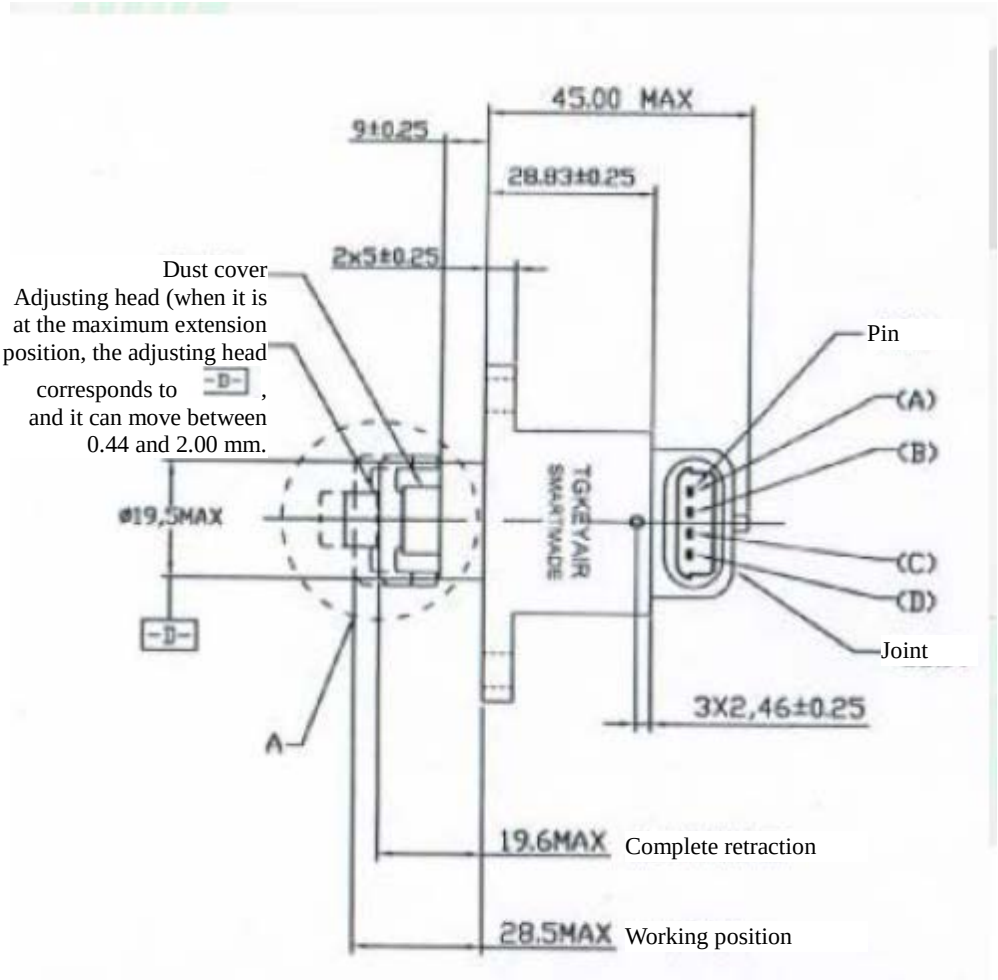


1. Valve plate; 2. Intake air manifold; 4. Idle speed stepper motor; 5. By-pass port

•Working principle of idle speed stepper motor

The function of idle speed control valve is to control the flow area of bypass air passage of throttle body, so as to adjust the air volume of engine and control the idle speed of engine.

•Definition of pin



•Characteristic parameter:

Rated voltage:	12Vdc
Maximum / minimum working voltage	7.5Vdc/14Vdc
Resistance per coil (@27°C):	53Ω±5.3
Maximum resistance(@-40°C):	35Ω
Inductance per coil (@25°C):	33.5mH±6(1kHz)
Stepped distance (stepped frequency):	0.04167mm
Maximum travel:	8.5mm (204 steps)
Operating temperature range:	-40°C -125°C (150°C peak value)
Minimum storage temperature:	-40°C
Weight:	110 g

•Cleaning

The stepper motor assembly is integrated at throttle body. For cleaning, first disassemble stepper motor and then clean it using a clean cloth.

•Appearance of idle speed stepper motor

Carbon Canister Solenoid Valve (ECP)

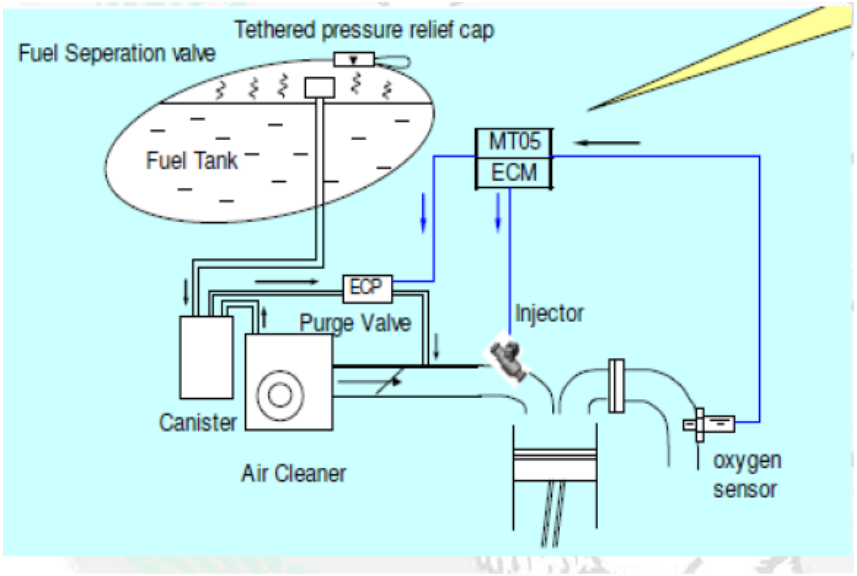
•Overview of working principles

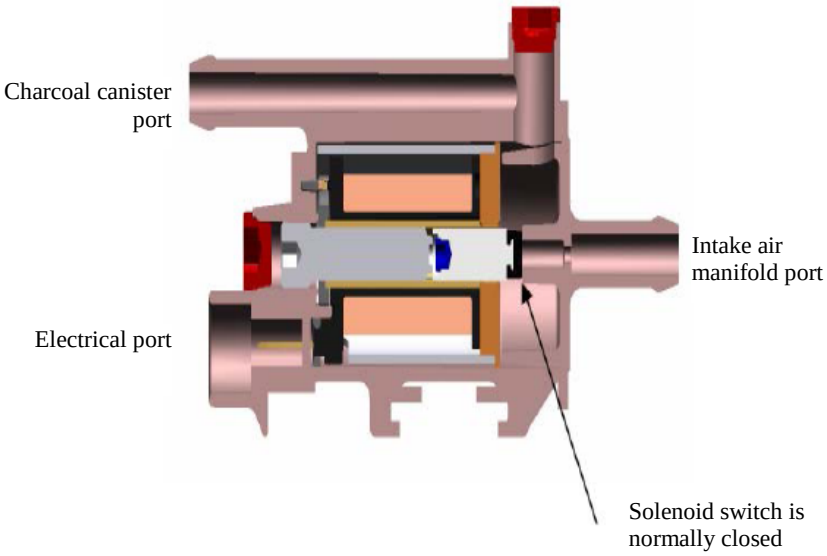
Carbon canister solenoid valve controls the fuel vapor in the carbon canister into engine intake system from carbon canister, and make it burn in the engine. Thus, reduce fuel evaporation emission.

•Appearance

The appearance of carbon canister solenoid valve is shown below:

•The ECP solenoid valve pins do not have positive and negative electrodes, and the connection method is as shown below

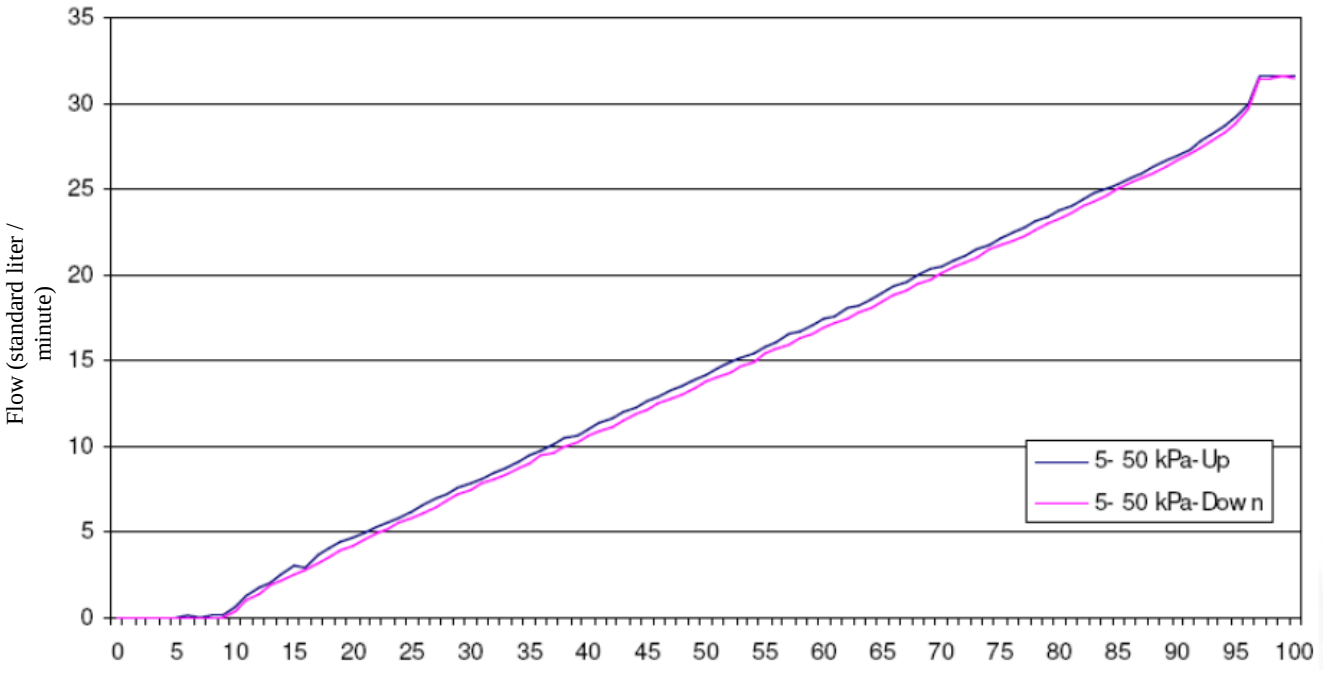




•Technical parameters

- ✧ ☐ Normal operating voltage: 8-16V VDC
- ✧ ☐ Operating temperature: -40-120°C
- ✧ ☐ Operating frequency: 16 Hz
- ✧ ☐ Maximum flow: 25-35L/min

Flow curve is as shown below:



Duty cycle (%)

• Installation requirements

- ✧ Carbon canister solenoid valve should be horizontally installed at motorcycle.
- ✧ Carbon canister solenoid valve should be placed at the position near the center rotation axis of crankshaft, to reduce shock.

☐

Fault Maintenance Diagnosis Method of EFI System

Directly Making the Fault Lamp at Instrument Flash for Diagnosis

Fault lamp [A] is located on the meter panel and has a mark below it. Under normal circumstances, open the key, the fault lamps will be on normally, indicating that the EFI system is a state with power supply, and it can work; fault lamp is off, indicating that there is no power supply in EFI circuit, it will not work, and check should be conducted for the connection of positive and negative electrodes of fuse and battery. After starting the engine, fault lamp goes off, indicating that there is no fault; on the contrary, fault lamp is normally on after starting engine, indicating that EFI system is not normal and there is a fault for troubleshooting.

In the case that a fault is confirmed, after opening and closing the key for 3 times, namely the operation of opening---closing--- opening---closing –opening key, the fault lamp will flash the trouble code of corresponding fault. Then, corresponding fault can be identified through trouble code table.

Of them, when using the method to read fault using fault lamp, the trouble code rule is as follows: for example, the fault is the open circuit of manifold absolute pressure sensor or short circuit of signal terminal pin to the negative electrode of battery, the fault lamp will flash for 10 times to represent 0, flash for 1 time to represent 1 after 1.2 seconds, flash for 10 times to represent 0 after 1.2 seconds, flash for 7 times to represent 7 after 1.2 seconds, namely P0107. It can be seen that except that number 0 is represented by flashing for 10 times, numbers 1-9 correspond to the times of flashing. If there are other trouble codes, such as fault P0201, there is fault in the fuel injector of cylinder 1. After flashing P0107, wait for 3.2 seconds, continue to flash P0201 trouble code; if there is no other fault, it will flash P0107 and P0201cyclically. Then, relevant faults can be queried according to trouble code table.

When using PCHUD software, the software will report trouble code using decimal numbers. In trouble code table, there is an one-to-one correspondence relationship between decimal numbers and previous hexadecimal numbers, and thus corresponding faults may be found according to the correspondence relationship. For example, MULFCURR (current fault) = 263 in the software, it corresponds to P0107 in trouble code table, namely manifold absolute pressure sensor fault.

•MT05 Trouble Code Table

System or Component	DTC Description	DTC Number	
		HEX (Diagnostic instrument display)	DEC (software display）
Manifold Absolute Pressure Sensor (MAP)	MAP Circuit Low Voltage or Open	107	263
	MAP Circuit High Voltage	—_108	264
Intake Air Temperature Sensor (IAT)	IAT Circuit Low Voltage	112	274
	IAT Circuit High Voltage or Open	113	275
Coolant/Oil Sensor	Coolant/Oil Temperature Sensor Circuit Low Voltage	117	279
	Coolant/Oil Temperature Sensor Circuit High Voltage or Open	118	280
Throttle Position Sensor (TPS)	TPS Circuit Low Voltage or Open	122	290
	TPS Circuit High Voltage	123	291
Oxygen Sensor	ircuit Low Voltage	131	305
	Circuit High Voltage	'..132	306
Oxygen Sensor Heater	Heater Circuit High Voltage	3|	49
	Heater Circuit Low Voltage	32	50
Fuel Injector A	Injector A Fault	:丨丨1	513
Fuel pump Relay (FPR)	FPR Coil Circuit Low Voltage 厂 or Open	230	560
	FPR Coil Circuit High Voltage	232	562
Crankshaft Position Sensor (CKP)	CKP Sensor Noisy Signal	336	822
	CKP Sensor No Signal	337	823
Ignition Coil A	Cylinder A Ignition Coil fault	351	849
Idle Control System	Idle Speed Control Error	505	1285
System Voltage	System Voltage Low	562	1378
	System Voltage High	563	1379
MIL	MIL Circuit Malfunction	650	1616
Tachometer	Tachometer Circuit Low Voltage	1693	5779
	Tachometer Circuit High Voltage	1694	5780
Vehicle Speed Sensor	VSS No Signal	500	1280

Park Neutral Switch Diag	Park Neutral Switch Error	850	2128
CCP	CCP short to high	445	1093
	CCP short to low/open	444	1092
Rollover Sensor Diagnostic	Rollover Sensor malfunction/Triggered	1500	5376
BLM_MaxAdapt	Several BLM value hit maximum	171	369
BLM_MinAdapt	Several BLM value hit minimum	172	370
PESystLean	PE mode burned AFR keeps lean	174	372

Diagnosing Fault Using Diagnostic Tool

• Diagnostic Tool

•Operation Method:

a) Find the 6-hole diagnose interface at motorcycle;

b) Connect connecting wire and diagnostic tool interface;

c) Open the key for diagnosis.

⚠Warning
✧ XCM-PT100X diagnostic tool is a high-precision instrument, so it should be protected from shock and vibration; ✧ If the instrument cannot work properly or display stably after the first start-up, please unplug the power cord and try again. ✧ Please ensure that the connector is always tightened in the diagnostic connector; ✧ It is forbidden to test the electric signal exceeding the limit value. ✧ The driver is forbidden to operate the instrument during driving. ✧ Use and storage conditions: Ambient temperature: 0- 50 degrees Celsius Relative humidity: less than 90%

Checking Fault Using Diagnostic Software PCHUD

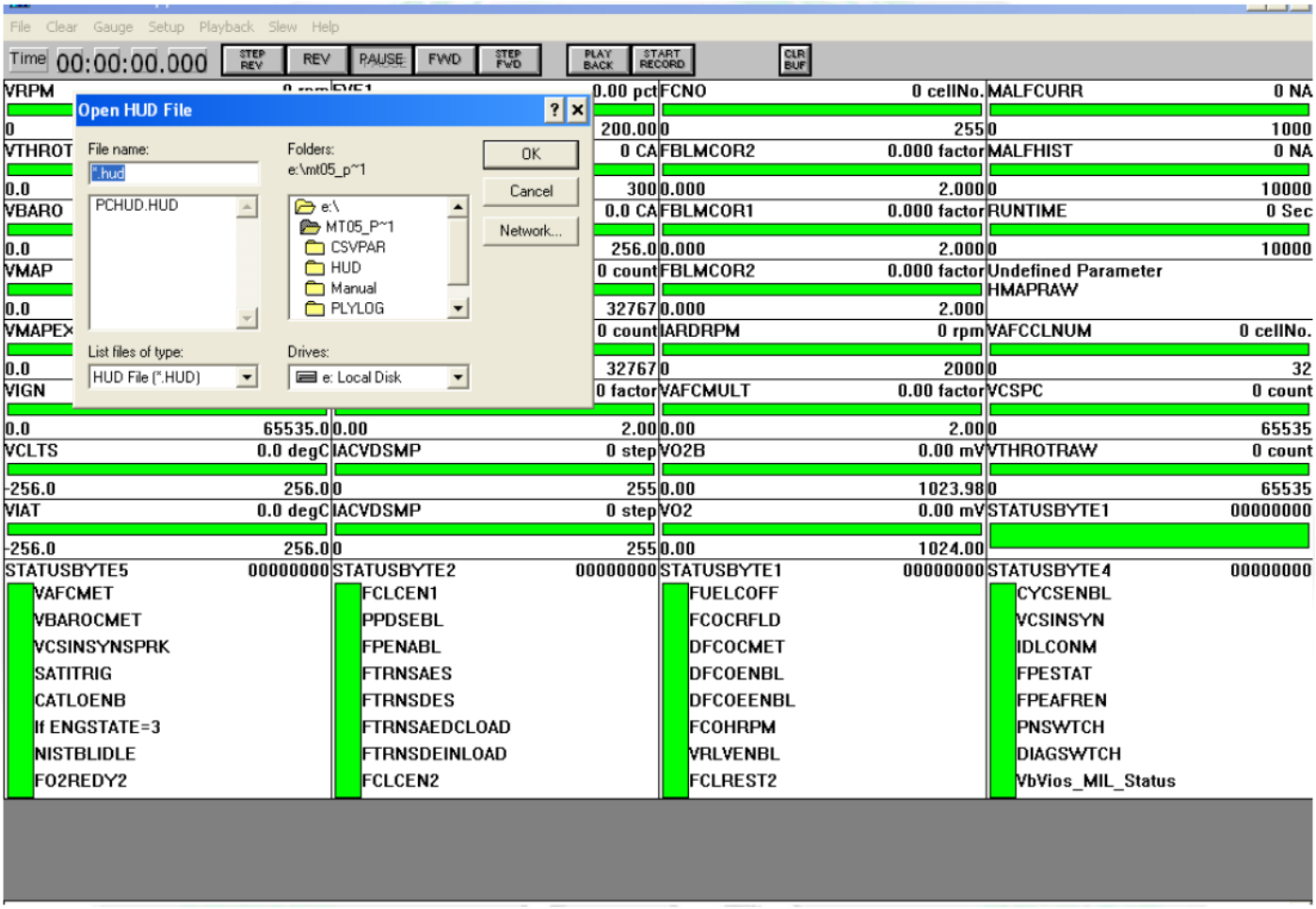
PCHUD software used to detect and record engine operating data, laptop should be connected to 6-hole diagnostic port of motorcycle through K line before use, and diagnosis port should be below rear seat. Please note that PCHUD system only supports 16Bit Microsoft Windows operating system or a very small number of 32bit Windows operating system, does not support 64bit systems such as Win7, Win8 or iOS, etc. It needs to install K-line driver software at the laptop before use.

• PCHUD Software Instructions:

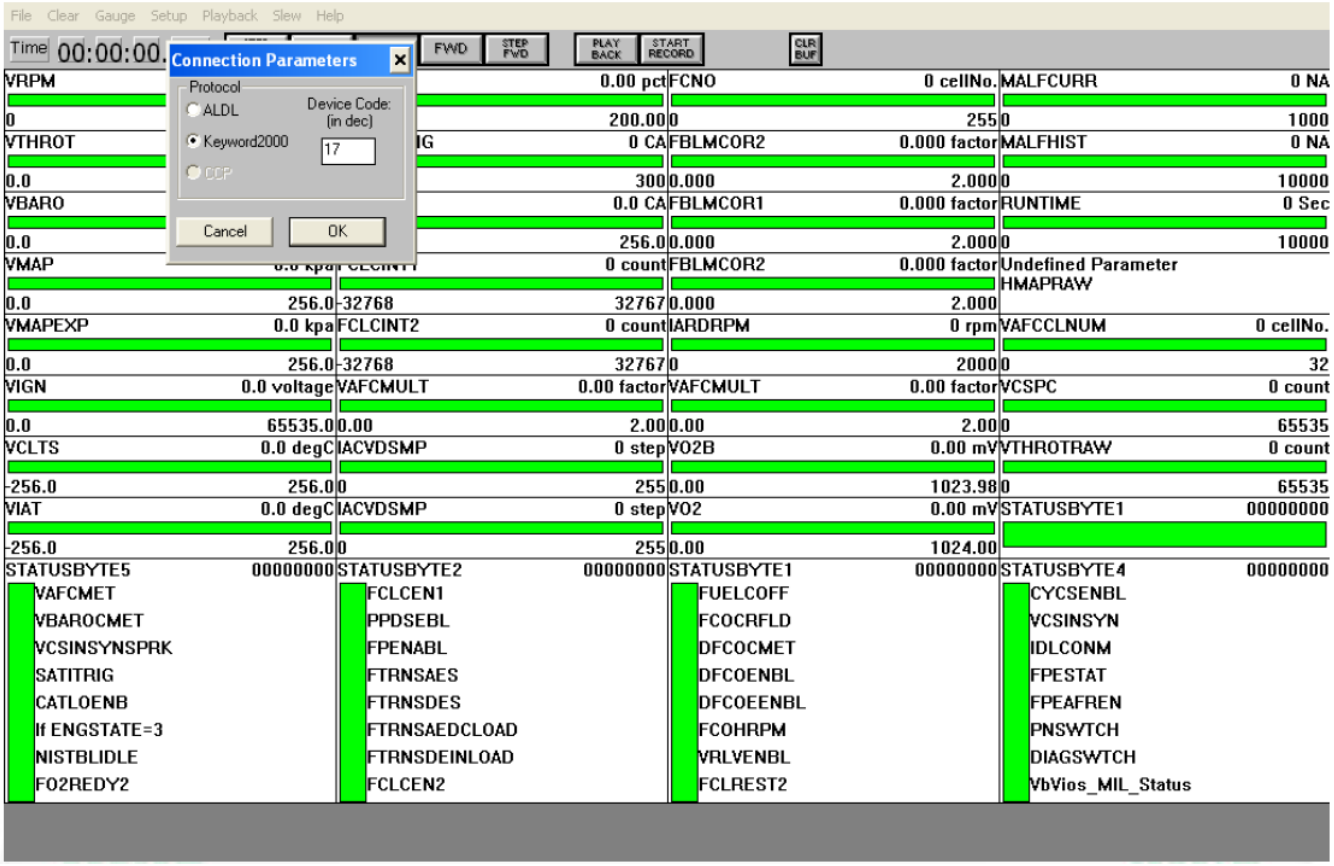
(1) Connect laptop and 6-hole diagnostic port of motorcycle using K line and open the key;

(2) Click “HUD.EXE” icon and start PCHUD software;

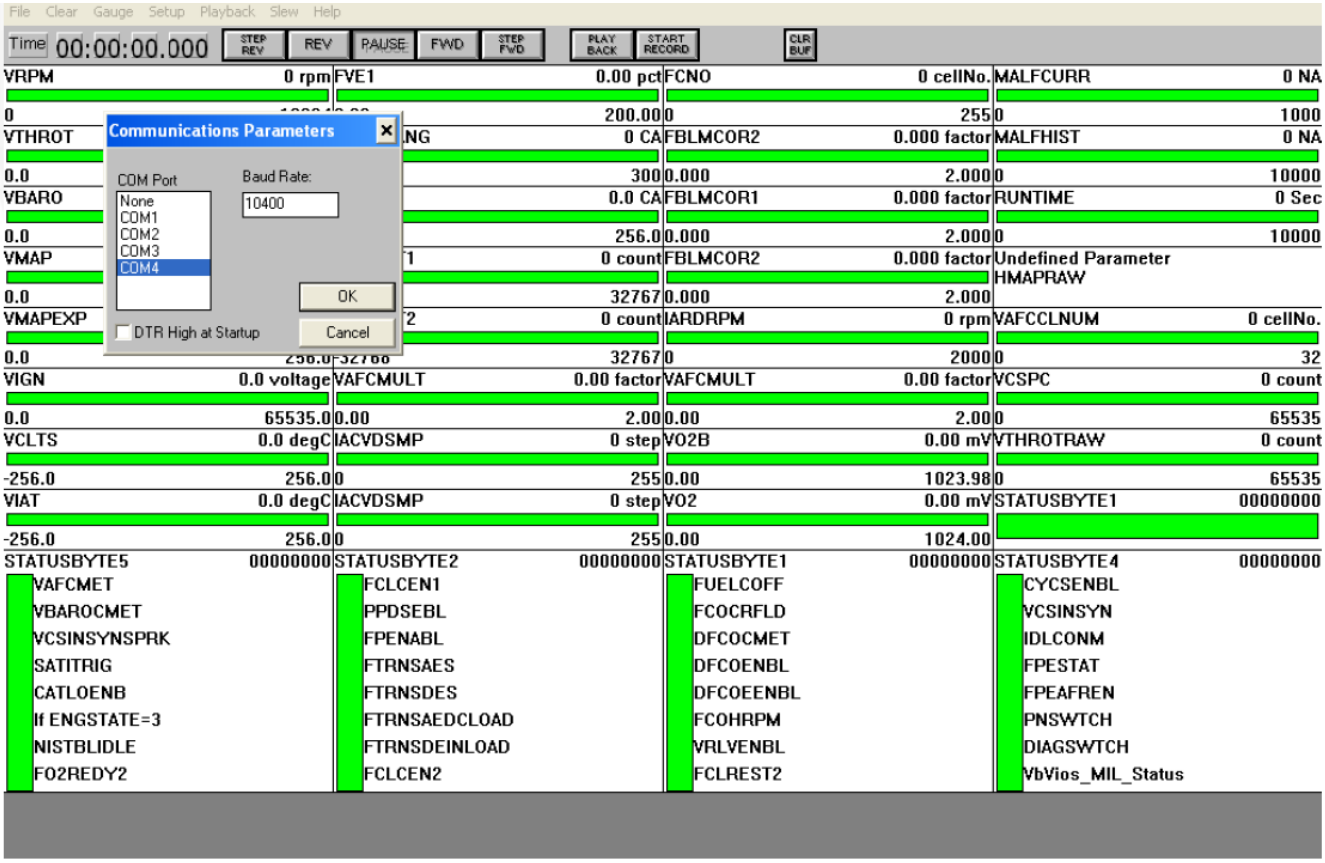
(3) Select “File” in the software interface, click “open” to select “PCHUD.HAD”, and then click OK for confirmation.



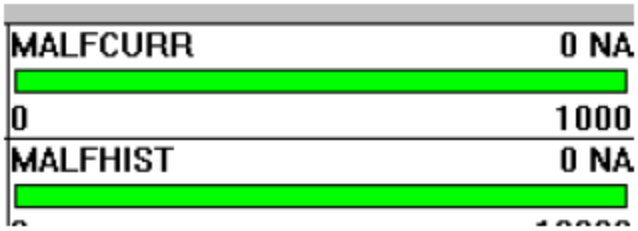
(4) Select “Parameter File” under “Setup”, click MT05common.par file, select “Comm protocol under “Setup”, select “Keyword2000” and then click OK, at the same time select the Device Code of 17.


File Clear Gauge Setup Playback Slew Help
Time 00:00:00.
FWD
STEP FWD
PLAY BACK
START RECORD
CLR BUF
Connection Parameters
Protocol
ALDL
Keyword2000
CCP
Device Code: (in dec)
17
Cancel
OK
VRPM 0.00 pct FCNO 0 cellNo. MALFCURR 0 NA
0 200.00 0 255 0 1000
VTHROT 0 CA FBLMCOR2 0.000 factor MALFHIST 0 NA
0.0 300 0.000 2.000 0 10000
VBARO 0.0 CA FBLMCOR1 0.000 factor RUNTIME 0 Sec
0.0 256.0 0.000 2.000 0 10000
VMAP 0 count FBLMCOR2 0.000 factor Undefined Parameter HMAPRAW
0.0 256.0 -32768 32767 0.000 2.000
VMAPEXP 0.0 kpa FCLCINT2 0 count IARDRPM 0 rpm VAFCCLNUM 0 cellNo.
0.0 256.0 -32768 32767 0 2000 0 32
VIGN 0.0 voltage VAFCMULT 0.00 factor VAFCMULT 0.00 factor VCSPC 0 count
0.0 65535.0 0.00 2.00 0.00 2.00 0 65535
VCLTS 0.0 degC IACVDSMP 0 step VO2B 0.00 mV VTHROTRAW 0 count
-256.0 256.0 0 255 0.00 1023.98 0 65535
VIAT 0.0 degC IACVDSMP 0 step VO2 0.00 mV STATUSBYTE1 00000000
-256.0 256.0 0 255 0.00 1024.00
STATUSBYTE5 00000000 STATUSBYTE2 00000000 STATUSBYTE1 00000000 STATUSBYTE4 00000000
VAFCMET FCLCEN1 FUELCOFF CYCSENBL
VBAROCMET PPDSEBL FCOCRFLD VCSINSYN
VCSINSYNSPRK FPENABL DFCOCMET IDLCONM
SATITRIG FTRNSAES DFCOENBL FPESTAT
CATLOENB FTRNSDES DFCOEENBL FPEAFREN
If ENGSTATE=3 FTRNSAEDCLOAD FCOHRPM PNSWTCH
NISTBLIDLE FTRNSDEINLOAD VRLVENBL DIAGSWTCH
FO2REDY2 FCLCEN2 FCLREST2 VbVios_MIL_Status

(5) If the software interface cannot display the real-time communications data, it needs to conduct the following work: check whether there is problem in COM port connection setting, generally set COM Port: 4. Baud Rate:10400, and do not select DTR High at startup


File Clear Gauge Setup Playback Slew Help
Time 00:00:00.000
STEP REV
REV
PAUSE
FWD
STEP FWD
PLAY BACK
START RECORD
CLR BUF
Communications Parameters
COM Port
None
COM1
COM2
COM3
COM4
Baud Rate:
10400
OK
Cancel
DTR High at Startup
VRPM 0 rpm FVE1 0.00 pct FCNO 0 cellNo. MALFCURR 0 NA
0 200.00 0 255 0 1000
VTHROT 0 CA FBLMCOR2 0.000 factor MALFHIST 0 NA
0.0 300 0.000 2.000 0 10000
VBARO 0.0 CA FBLMCOR1 0.000 factor RUNTIME 0 Sec
0.0 256.0 0.000 2.000 0 10000
VMAP 0 count FBLMCOR2 0.000 factor Undefined Parameter HMAPRAW
0.0 32767 0.000 2.000
VMAPEXP 0 count IARDRPM 0 rpm VAFCCLNUM 0 cellNo.
0.0 32767 0 2000 0 32
VIGN 0.0 voltage VAFCMULT 0.00 factor VAFCMULT 0.00 factor VCSPC 0 count
0.0 65535.0 0.00 2.00 0.00 2.00 0 65535
VCLTS 0.0 degC IACVDSMP 0 step VO2B 0.00 mV VTHROTRAW 0 count
-256.0 256.0 0 255 0.00 1023.98 0 65535
VIAT 0.0 degC IACVDSMP 0 step VO2 0.00 mV STATUSBYTE1 00000000
-256.0 256.0 0 255 0.00 1024.00
STATUSBYTE5 00000000 STATUSBYTE2 00000000 STATUSBYTE1 00000000 STATUSBYTE4 00000000
VAFCMET FCLCEN1 FUELCOFF CYCSENBL
VBAROCMET PPDSEBL FCOCRFLD VCSINSYN
VCSINSYNSPRK FPENABL DFCOCMET IDLCONM
SATITRIG FTRNSAES DFCOENBL FPESTAT
CATLOENB FTRNSDES DFCOEENBL FPEAFREN
If ENGSTATE=3 FTRNSAEDCLOAD FCOHRPM PNSWTCH
NISTBLIDLE FTRNSDEINLOAD VRLVENBL DIAGSWTCH
FO2REDY2 FCLCEN2 FCLREST2 VbVios_MIL_Status

And then conduct normal communications, display the current trouble code at MALFCURR, and display historical trouble code at MALFHIST.



And then query the corresponding fault according to trouble code table.

•PCHUD Software Parameter Interpretation:

VRPM	engine speed
VTHROT	throttle position
VBARO	ATMOSPHERIC PRESSURE
VMAP	manifold absolute pressure
VMAPEXP	expect manifold absolute pressure
VIGN	battery voltage
VCLTS	cylinder temperature or coolant temperature
VIAT	intake air temperature
STATUSBYTE5	STATUSBYTE5
VAFCMET	airflow correction met
VBAROCMET	Atmospheric pressure update met
VCSINSYNSPRK	sequential spark enable
SATITRIG	tip-in Spark Advance retard trigger
CATLOENB	catalyst light-off logic enable
IF ENGSTATE=3	engine work in run state
NISTBLIDLE	stable warm idle
FCNO	block learn memory cell
FBLMCOR1	cylinder 1 block learn memory
FCLCINT1	integral of close loop correction
FCLCMUL1	close loop correction
IARDRPM	desired idle rpm
IARPMERR	idle rpm deviation
FPWVC1	base pulse width of cylinder 1
VO2	Oxygen sensor signal
STATUSBYTE3	STATUSBYTE3
FO2STAT1	cylinder 1 oxygen sensor signal rich lean state
FCLREST1	cylinder 1 close loop correction reset
FOSHTREN	Oxygen sensor heater enable
FO2REDY1	cylinder 1 Oxygen sensor ready
IF IACV MODE=0	idle airflow control valve close loop correction enable
IAMTRLOST	IACV lost
IACMVIHB	IACV move disable
VIGNS	ignition state
FVE1	cylinder 1 Volumetric efficiency

VMAPRANG	MAP read angle
AFFNLAFR	target air fuel ratio
SAESTA	cylinder 1 Advanced ignition angle
SAIDLDYN	idle dynamic Spark Advance
SPDWELL	dwell time
IAINTEGOFST	airflow integral of idle air control valve
IACVDSMP	desired position of idld air control valve
STATUSBYTE2	STATUSBYTE2
FCLCEN1	cylinder 1 close loop correction enable
PPDSEBL	prime pulse disable
FPENABL	fuel pump enable
FTRNSAES	acceleration enrich enter
FTRNSDES	deceleration attenuate enter
FTRNSAEDCLOAD	acceleration enrich exit
FTRNSDEINLOAD	deceleration attenuate exit

•Diagnosis Process:

l. Insert the key on vehicle and do not start the motorcycle, please check:

Parameter	Check and Record	Min	Max	Description	Units
VIGN	□Norm □Abnormal	11.5	13	battery voltage	volt
VTHROT	□Norm □Abnormal	0	1	fully closed throttle position	percent
VTHROT	□Norm □Abnormal	98	100	fully open throttle position	percent
VTHROTRAW	□Norm □Abnormal	4000	9000	Absolutely throttle body voltage AD	None
VBARO	□Norm □Abnormal	98	103	atmospheric pressure	kpa
VIAT	□Norm □Abnormal	-15	40	intake air temperature	degC
VCLTS	□Norm □Abnormal	-15	40	cylinder temperature or coolant temperature	degC

2. Starting:

Parameter	Check and Record	Min	Max	Description	Units
Start	□Norm □Abnormal	-	-	-	-
TERRCNT	□Norm □Abnormal	0	0	Fly wheel tooth error counter	count

FUELCOFF	□Norm □Abnormal	0	0	fuel cut-off enable, the normal flag is white, if not blue	None
VRLVENBL	□Norm □Abnormal	0	0	Rollover sensor enable, normal is white, if not blue	None

3. The parameters can be checked 1 min for idle speed after vehicle starting. And then check the stability of EFI parameter after 3 minutes of long idle.

Parameter	Check and Record	Min	_ Max	Description	Units
VRPM	□Norm □Abnormal	1300	1700	engine speed	rpm
VTHROT	□Norm □Abnormal	0	1	fully closed throttle position	percent
MALFCURR	□Norm □Abnormal	0	0	current MALF code	None
VBARO	□Norm □Abnormal	98	103	atmospheric pressure	kpa
VMAP	□Norm □Abnormal	^ 47	53	intake pressure measured value	kpa
VIGN	Norm □Abnormal	12	16	battery voltage	volt
PNSWTCH	□Norm □Abnormal	0	0	Neutral and Clutch switch enable flag, blue is working	None
IACVDSMP	□Norm □Abnormal	10	60	stepping motor target value	step
vehicle speed	□Norm □Abnormal	0	0	vehicle speed	Km/h
FBLMCOR1	□Norm □Abnormal	—.75	1.15	cylinder 1 block learn memory	factor
FBLMCOR2	□Norm □Abnormal	0.75	1.15	cylinder 2 block learn memory	factor
FCLCINT1	□Norm □Abnormal	-15	15	cylinder 1 integral of lose loop correction	count
FCLCINT2	□Norm □Abnormal	-15	15	cylinder 2 integral of close loop correction	count
FPWVC1	□Norm □Abnormal	1.5	2.6	base pulse width of cylinder 1	ms
FPWVC2	□Norm □Abnormal	1.5	2.6	base pulse width of cylinder 2	ms
VO2	□Norm □Abnormal	45	850	cylinder 1 oxygen sensor voltage	mv
VO2B	□Norm □Abnormal	45	850	cylinder 2 oxygen sensor voltage	mv

4. Run with stable speed

Parameter	Check and Record	Min	Max	Description	Units
MALFCURR	□Norm □Abnormal	0	0	current MALF code	None

VCLTS	□Norm □Abnormal	40	105	cylinder temperature or coolant temperature	degC
VIGN	□Norm □Abnormal	12	16	battery voltage	volt
vehicle speed	□Norm □Abnormal	0	220	vehicle speed	Km/h
FBLMCOR1	□Norm □Abnormal	0.75	1.15	cylinder 1 block learn memory	factor
FBLMCOR2	□Norm □Abnormal	0.75	1.15	cylinder 2 block learn memory	factor
FCLCINT1	□Norm □Abnormal	-15	15	cylinder 1 integral of lose loop correction	count
FCLCINT2	□Norm □Abnormal	-15	15	cylinder 2 integral of close loop correction	count
VO2	□Norm □Abnormal	45	850	cylinder 1 oxygen sensor voltage	mv
VO2B	□Norm □Abnormal	45	850	cylinder 2 oxygen sensor voltage	.mv

5. Top speed with full throttle (PE mode, power enrich)

PE mode: 70% < VTHROT < 100%, in this situation, the value of oxygen sensor(VO2 VO2B) is around 800mv.

Parameter	Check and Record	Min	Max	Description	Units
VCLTS	□Norm □Abnormal	80	105	cylinder temperature or coolant temperature	degC
VIGN	□Norm □Abnormal	12	16	battery voltage	volt
VO2	□Norm □Abnormal	750	950	cylinder 1 oxygen sensor voltage	mv
VO2B	□Norm □Abnormal —	750	950	cylinder 2 oxygen sensor voltage	mv

Common Troubleshooting Methods of electronic Fuel Injection System

Maintenance Tool

a) Disassembly and assembly of electronic control system components - common automotive mechanical parts removal tool

b) Electronic control system circuit and system electrical signal - digital multimeter (with buzzer)

c) Electric control system fault diagnosis and engine working condition detection

☐■ Electronic control system fault diagnostic tool (recommended)

☐■ Fault diagnosis software (PCHUD) and interface connection (conditional use)

d) electronic control system trouble code table (emergency use)

e) fuel pressure gauge, range: 0-300kP

Engine Working Data Flow Displayed by Diagnostic Tool

Analyze and determine engine fault using the engine working data flow displayed by the diagnostic tool.

Step I

a) Engine harness and the vacuum pipeline—may affect the system to control air flow and fuel supply

b) Whether oxygen sensor is assembled in place—may affect the system to determine the air to fuel ratio

c) Engine fault indicator—may affect the system to give an alarm for fault

d) Battery voltage—determine whether the power of battery is sufficient

e) Determine whether coolant temperature sensor, intake air temperature sensor, intake air manifold absolute pressure sensor and oxygen sensor display value are normal

f) Working range of throttle position sensor—it cannot be fully opened or closed, which may affect engine power performance and some system functions

Step II

Whether ECU power is turned off—the communications between diagnostic tool and system is interrupted after turning off key switch

Step III

a) Coolant temperature and coolant temperature cycle—indicate whether the thermostat is working properly

b) Battery voltage (14V) —Indicate whether the generator is working properly.
Too high: there may be fault in voltage regulator;
Too low: there may be improper connection of generator or generator fault

c) Intake air manifold pressure—it can predict whether there is leakage in intake air and valve clearance problems
Valve clearance is too small: this value is too high, so engine power performance may be affected; in addition, due to too early opening of exhaust valve and increase in exhaust temperature, oxygen sensor and three-way catalytic converter service life may be significantly shortened;
Valve clearance is too large: it may cause low intake air manifold pressure, and thus affect the system to determine the working state of engine, thus resulting in abnormal idle speed during warm-up of motorcycle.
In addition, if the exhaust system is blocked, for example: a foreign body exists in the exhaust channel; the oil consumption is too high, thus blocking three-way catalytic converter; three-way catalytic converter is blocked due to internal damage, which will cause slightly high value.

d) Number of cycles of oxygen sensor value—the number of cycles is too small, indicating fault of oxygen sensor.

Concise Troubleshooting

Please follow the following steps to repair EFI system. To repair fault in one step, the subsequent steps may be stopped. And then use diagnostic tool to conduct inspection and acceptance and clear trouble code according to section “Engine Working Data Flow Displayed by Diagnostic Tool”.

When using diagnostic tool, the voltage of battery should not be lower than 8.5 V.

Daily Use and Maintenance

- Gasoline should be high quality without lead.
- ECU has a moisture-proof function, but high-pressure water gun should not be used to rinse its shell.
- The fuel filter should be changed every 18,000 km.
- Under normal conditions of use, clean the throttle body every 10,000 km or 1 year.

Fault Phenomenon-Start Fault

a) Rotate ignition switch to “On” position, and check whether engine fault lamp is on

If it is off:	◆ Check fuse and grounding wire ◆ Check whether ECU plug is connected firmly ◆ It is able to check whether this lamp and line is normal using the check function of diagnostic tool actuator

	◆ Check and repair bulb and its line
It is be able to be on:	◆ Connect diagnostic tool to system diagnosis interface

b) Whether diagnostic tool can be connected to system for communications

If not:	◆ Check fuse and grounding line ◆ Check whether ECU plug is connected firmly ◆ Test whether diagnostic tool is working normally at another normal motorcycle
If yes:	◆ Remove the fault indicated by diagnostic tool

c) Check ignition system fault—whether normal ignition can be made for spark plug

If not:	◆ Check whether high-voltage line and spark plug are plugged firmly or damaged ◆ Use another ignition coil for assembly judgment ◆ Use ECU for judgment
If yes:	◆ Check whether high-voltage line is connected to ignition coil and spark plug properly

d) Check fuel supply system fault

Check whether fuel pump is working—it is able to hear the sound that the fuel pump is working near the fuel tank when starting engine

Not work:	◆ Check whether fuel pump relay is working normally ◆ Check whether the connection and working of crankshaft position sensor is normal ◆ Use ECU for judgment ◆ Check fuel pump line	
Be able to work:	1) Check whether fuel supply pressure is greater than 220Kpa	
	2) Insufficient pressure:	◆ Check whether there is sufficient fuel in the fuel tank ◆ Check whether fuel filter needs to be replaced (note: replace the fuel filter special for electronic injection should be replaced once every 18000km) ◆ Check whether fuel supply pipe and fuel return pipe are damaged
	3) Normal pressure:	◆ Check whether there is any abnormality in nozzle control line ◆ Check whether nozzle needs to be cleaned

e) Confirm whether cylinder is submerged

If yes:	◆ After completely opening the throttle and turning on starting motor, there should be working sign in engine after several seconds

f) Check whether crankshaft position sensor clearance is too large

Fault Phenomenon—Start Failure with Tempering

a) Check whether ignition coil is loosened

b) Check whether timing gear ring is loosened

Fault Phenomenon—Instable Idle Speed

Idle control system:	Check whether the idle speed bypass screws is loosened
fuel supply system:	Check whether there is leakage in fuel hoseline

Fault Phenomenon—Too High or Too Low Idle Speed (Idle speed is obviously inconsistent with target idle speed)

Too high idle speed:	◆ When the coolant temperature is lower than 68 degrees, the system will increase idle speed to accelerate warming-up process, which is normal phenomenon. Check the items according to the following items except that ◆ Check whether it needs to adjust the cylinder vacuum ◆ Check whether valve clearance, especially exhaust valve clearance is too large

Too low idle speed:	◆ Check fuel quantity in fuel tank, fuel filter, fuel line pressure and nozzle ◆ One way valve clearance and confirm whether it is too small

Fault Phenomenon—Instable Idle Speed with Deceleration and Flameout

a) One way valve clearance

b) Check whether idle speed bypass hole and throttle body are too dirty

Fault Phenomenon—Insufficient Power of Deceleration

a) Check whether the parameters are normal at idle speed and high idle speed;

b) Check fuel quantity in the fuel tank and fuel filter;

c) Check whether exhaust system is blocked, for example: whether three-way catalytic converter is blocked by burning oil or damage;

d) Check fuel line pressure and nozzle;

e) Check whether fault lamp is on, and whether normal ignition can be conducted for only one cylinder

Fault Phenomenon—Slight Burning Phenomenon

Check whether the spark plug gap meets specification of 0.6-0.7mm

Fault Phenomenon—Fault lamp is on, but trouble code is inconsistent with fault

It may be caused due to instable connection of system grounding wire, reconnect the grounding wire, disconnect the power wire of battery for 3 minutes and then connect it and start engine.

Fault Phenomenon—Extremely High Fuel Consumption

a) Check whether the oxygen sensors of two cylinders are assembled in place; if it is in the loose state, the oxygen sensor may incorrectly judge that the combustion in the cylinder is thin, and then increase fuel, which may result in unusually high fuel consumption.

b) After confirming that the engine mechanical parts and oxygen sensor are in normal conditions, run the engine to observe the oxygen sensor reading. If the reading is always greater than 500 mV at normal water temperature, check whether there is leakage in fuel injector.

Notes

- The vast majority of EFI parts cannot be repaired; after the confirmation of damaged parts, generally replacement is taken.
- When starting the engine, do not operate any mechanism (including the throttle, do not pull the throttle for start) on the engine.
- If engine fault lamp becomes on during the engine operation, cause must be checked and eliminated as soon as possible.
- Do not use leaded gasoline, because lead may damage the oxygen sensor and three-way catalytic converter.
- If fuel consumption is abnormal, the problem should be resolved as soon as possible, because some of the substances in the fuel may damage the oxygen sensor and three-way catalytic converter.
- Valve clearance should not be too small, if the exhaust valve is not shut off tightly, exhaust temperature may become too high and thus shorten the life of three-way catalytic converter.
- At the temperature of below 10°C, if the vehicle and engine run at low speed for a long time, the exhaust pipe may have carbon deposits and become black, which is a normal phenomenon. It will be eliminated after a period of high-speed operation, or appropriate means should be taken to keep the engine coolant temperature within the specified temperature range.

Sample of Diagnosis Table

Name of rider:		**Registration number (license number):**	**Year of first registration:**
Model:		**Engine No.:**	**Frame No.:**
Date in the event of a fault:			**Mileage:**
Environment in the event of a fault:			
Weather	□Clear □ Cloudy □Rain □Snow □Fair □Others:		
Temperature	□ Hot □ Cold □Very Cold □General □Others:		
Fault frequency	□Usually □Often □Once		
Road conditions	□Streets □Highways □ Mountain roads (□Uphill, □Downhill) □Rough roads □Crushed stone roads		
Altitude	□Normal □High altitude (about 1000 m or above)		
State of motor in the event of a fault			
Alarm indicator (LED)	□Last for about 3 seconds after opening electric door lock, and alternatively display FI alarm information and FI warning sign at LCD (EFI system fault).		
	□Display FI flashing burglar alarm system warning information and sign at LED display after opening the electric door lock for 3 seconds (anti-theft control system fault).		
	□Alarm lamp is off after opening the electric door lock for 3 seconds.		
Difficulty in starting	□Starting motor does not run.		
	□Starting motor is running, but engine is not started.		
	□Starting motor and engine are not started.		
	□Be unable to supply fuel (□there is no fuel in fuel tank, □there is no the sound that fuel pump is running).		
	□Submerge cylinder (do not open throttle valve when starting, to prevent submerging cylinder).		
	□Ignition cannot be made to spark plug.		
	□Others;		
Stalling of engine	□Engine stalls after starting.		
	□Engine stalls after opening the throttle.		
	□Engine stalls after closing the throttle.		
	□Engine stalls when moving motorcycle.		
	□Engine stalls when stopping motorcycle.		
	□Engine stalls when driving at constant speed.		
	□Others:		
Improper running at low speed	□Idle speed is very low, □Idle speed is very high, □Idle speed is instable.		
	□Battery voltage is low (test is after charging).		
	□Spark plug is loosened (tighten the spark plug).		
	□Spark plug is very dirty, damaged or the clearance is incorrect (correct it).		
	□Tempering.		
	□Blowout.		
	□It is blocked when speeding up.		
	□Oil viscosity is too high.		
	□Brake drags.		
	□Engine is overheated.		
	□Clutch slips.		
	□Others		
Insufficient power of acceleration	□Spark plug is loosened (tighten the spark plug).		
	□Spark plug is very dirty, damaged or the clearance is incorrect (correct it).		
	□Spark plug model is incorrect (replace it).		
	□Detonation (poor or incorrect oil, replace it with high octane gasoline).		
	□Brake drags.		
	□Clutch slips.		
	□Engine is overheated.		
	□Too much oil.		
	□Oil viscosity is too high.		
	□Others:		

CHAPTER IV COOLING SYSTEM

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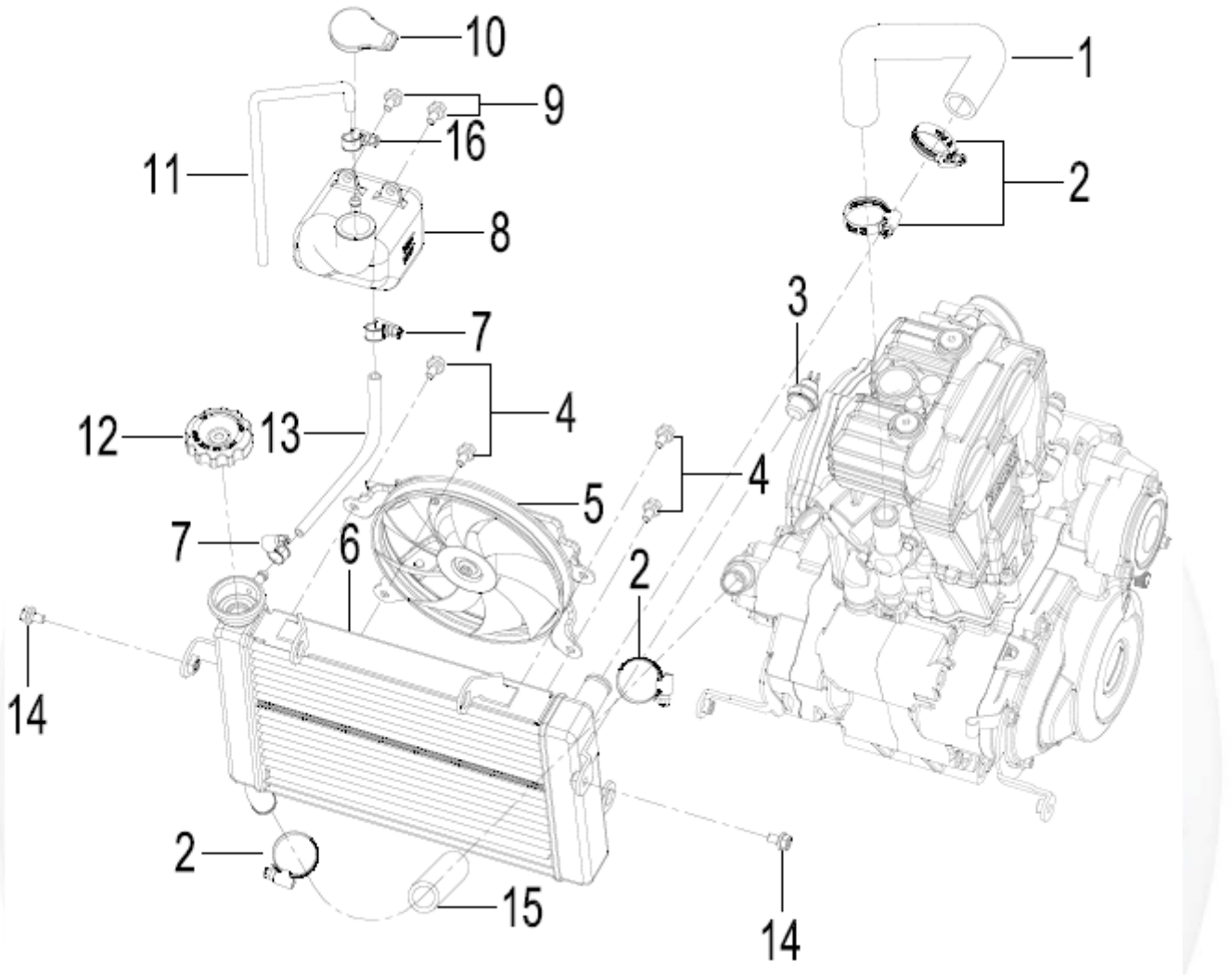
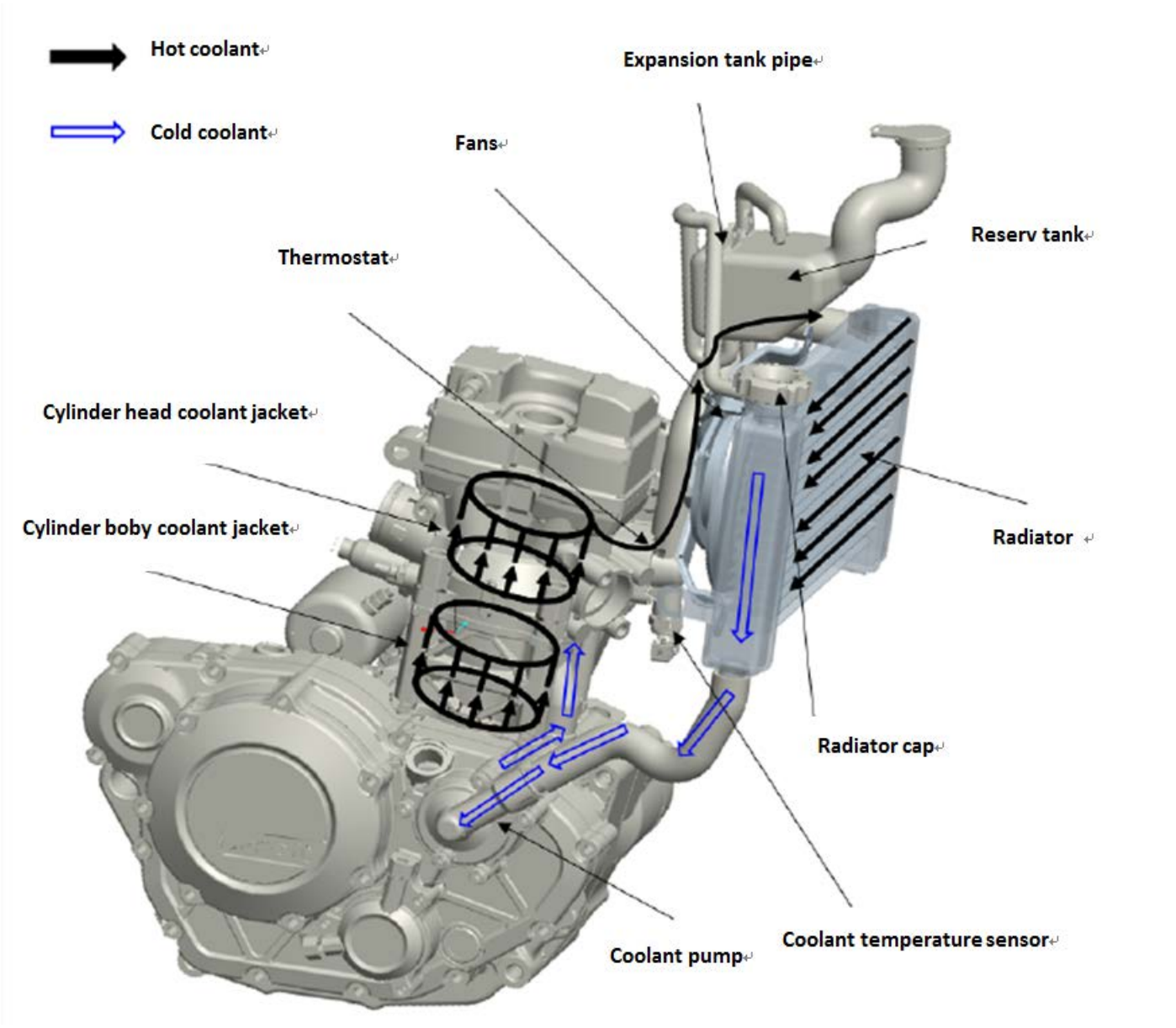
Explosive View



No.	Chinese name and specification	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Inlet hose				
2	Stainless steel clamp				
3	radiator fan switch				
4	Bolt M6×12	10	1.0	88.5 in·lb	
5	radiator fan				
6	Radiator				
7	Clamp (diameter : 10)				
8	Reserve tank				
9	Bolt M6×12	10	1.0	88.5 in·lb	
10	Reserve tank cover				
11	radiator overflow hose				
12	radiator cap				
13	Radiator overflow hose				
14	Bolt M6×20	10	1.0	88.5 in·lb	
15	Outlet hose				
16	Stainless steel clamp 16				

Coolant Flow Diagram



The permanent antifreeze is used to prevent the cooling system from rusting or being corroded as coolant. Once the engine starts, the pump begins to rotate and the coolant begins to circulate.

Using the paraffin base thermostat, the cooling system is on or off with the temperature changes of coolant. In order to keep the coolant in the proper temperature, the thermostat constantly changes the valve opening. If the temperature of the coolant is below 75℃, the thermostat will be turned off to restrict the flow of coolant through the exhaust holes so as to make the engine become heat more quickly. If the temperature of coolant is higher than 75° to 90℃, the thermostat will be turned on and the coolant will flow.

If the temperature of coolant exceeds 98℃, the radiator fan switch will start to operate to make the radiator fan rotate. If the air flow is insufficient (e.g.: when the motorcycle is running at low speed), the radiator fan will extract and draw air through the radiator fins so as to accelerate the cooling effect of radiator. If the temperature of coolant is below 93℃, the radiator fan relay will be disconnected and the radiator fan stops.

In this way, the cooling system controls the temperature of engine within a narrow range, and the engine can be operated efficiently even if the load of engine may change.

This cooling system is pressurized by the radiator cap to prevent the coolant from boiling and generating bubbles so that the engine is overheated. With the increase of engine temperature, the coolant in the radiator and water jacket will

expand. The redundant coolant will flow through the radiator cap and hose, then flow to the reserve tank and be stored in the reserve tank temporarily. Conversely, with the decrease of engine temperature, the coolant in the radiator and water jacket will shrink and the coolant stored in the reserve tank will return to the radiator.

There are two valves on the radiator cap. One is the pressure valve which controls the pressure in the cooling system when the engine is running. If the pressure exceeds 93 to 123 kPa, the pressure valve will open and release the pressure of reserve tank. After the pressure is released, the pressure valve will close and the pressure will be maintained between 93 to 123 kPa. When the engine is cooled, the other small valve (negative pressure valve) on the radiator cap opens. As the temperature of coolant decreases, the coolant will shrink and make the system form vacuum. The negative pressure make the coolant to flow from the reserve tank to the radiator.

Technical Parameters

Item	Standard
Prepared coolant in delivery	
(Recommended) Type	Permanent antifreeze
Color	Green
Mixing ratio	50% soft water, 50% coolant
Freezing point	-35℃
Amount	3.4L (Full fluid level of reserve tank, radiator and engine are included)
Radiator cap	
Release pressure	93-123kPa
Thermostat	
Opening valve temperature	75-90℃
Valve lift	≥7mm when 75℃

Coolant

Checking Whether Coolant Deteriorates

●Visually check the coolant in the fluid storage tank.

★If white cotton-wool flotages are observed, it indicates that the aluminum parts inside the cooling system have been corroded. If the coolant is brown, it indicates that the iron parts or steel parts rust. When any one of above situations occurs, please clean the cooling system.

★If the coolant emits odor, check whether there is air leakage in the cooling system. Because there may be some exhaust gas in the cooling system.

Checking Coolant Level

●See “Checking Coolant Level” in the “Regular Maintenance” chapter.

Discharging Coolant

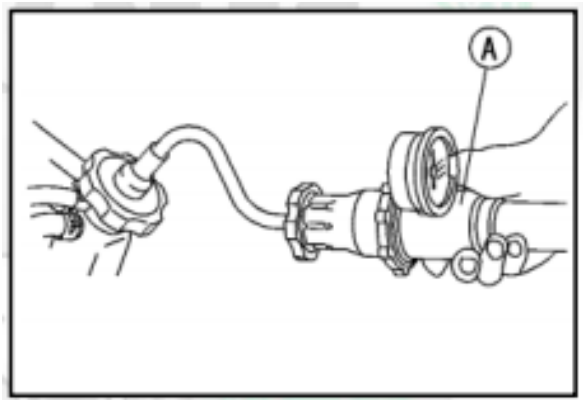
●See “Replacing Coolant” in the “Regular Maintenance” chapter.

Adding Coolant

●See “Replacing Coolant” in the “Regular Maintenance” chapter.

Detecting Pressure

●Remove the radiator cap and install the pressure meter [A] of cooling system on the filler.



Remark
○*Wet the sealing surface of radiator cap with water or coolant to prevent pressure leakage.*

●Increase the pressure in the system gradually until the pressure reaches 123kPa

Note
The pressure shall not exceed the maximum system design pressure during detection. The maximum pressure is 123kPa

●Observe the pressure meter at least 6 seconds.

★If the pressure is stable, the system is normal.

★If the pressure decreases and no external problem is found, check for internal air leakage. If it is found that a small amount of oil is mixed in the coolant, it indicates that the internal air leakage occurs. Check the cylinder head gasket and coolant pump.

●Remove the pressure meter, supplement the coolant and close the radiator cap.

Cleaning Cooling System

Sometimes, the rust, scale and calcium oxide will be deposited inside the pipeline cavity in the cooling system and radiator. Once rust, scale and calcium oxide are found, please clean the cooling system! Otherwise the above sediment will block the coolant passage, which will greatly reduce the efficiency of cooling system.

●Drain the cooling system (see “Replacing Coolant” in the “Regular Maintenance” chapter).

●Fill the cooling system with the mixture of fresh water and cleaner.

Note
Do not use the cleaner which can corrode the aluminum engine and radiator! **Please strictly follow the relevant specifications of instructions of cleaning products provided by the manufacturer!**

●Warm the engine up and keep it idling for about ten minutes.

●Turn off the engine and drain the cooling system.

●Fill the cooling system with fresh water.

●Warm the engine up and then drain the cooling system.

●Repeat the two steps described above again.

●Add the permanent coolant to the cooling system and drain the air in the cooling system (see “Replacing Coolant” in the “Regular Maintenance” chapter).

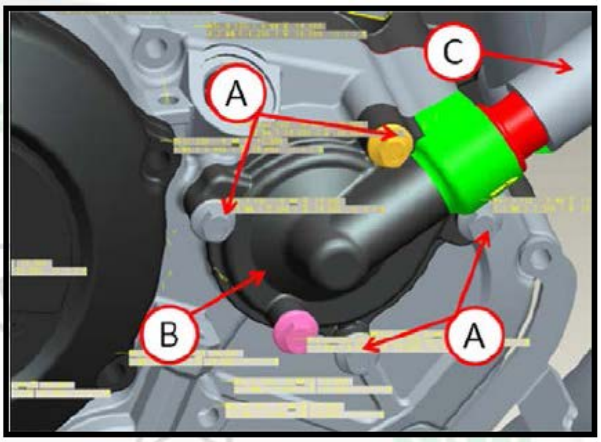
Disassembling/Installing Reserve Tank

●Disassemble the reserve tank before replacing the coolant and install it back after the replacement (see “Replacing Coolant” in the “Regular Maintenance” chapter).

coolant Pump

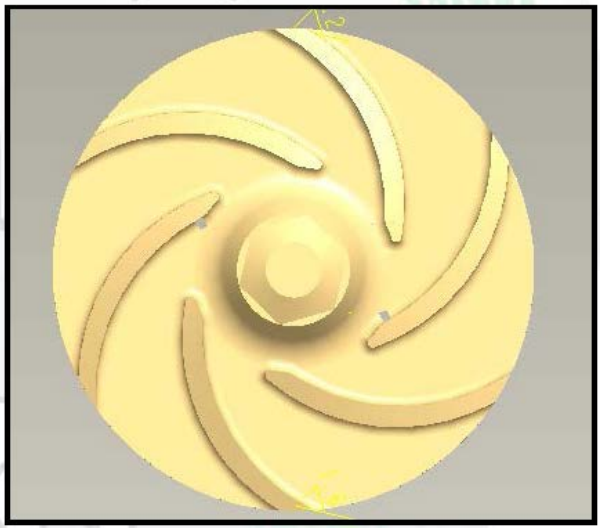
Disassembling coolant pump

●Remove the bottom cover (see “Disassembling Bottom Cover” in the “Frame” chapter),
●Drain the coolant (see “Replacing Coolant” in the “Regular Maintenance” chapter);
●Darin the oil (see “Replacing Oil” in the “Regular Maintenance” chapter);
●Removing:
coolant Pump Cover Bolt [A]
ooolant Pump Cover [B]
coolant hose [C]



Note:
This operation shall be conducted when the engine is cooled. Do not let the coolant splash to people when disconnect the coolant hose

●Remove the impeller [A] from the coolant pump shaft.



Installing coolant Pump

●Install the parts disassembled previously (see the corresponding chapters).
●Locking torque:
Locking torque of coolant pump cover bolt: 9.8 N·m
Locking torque of radiator coolant hose lock screw: 2.0 N·m

Checking coolant Pump Impeller

●Visually check the coolant pump impeller.

★If the surface of impeller has been corroded or the blade has been broken, replace the coolant pump assembly.

Radiator

Disassembling Radiator and Radiator Fan

●Remove the radiator fairing (see “Disassembling Radiator Fairing” in the “Frame” chapter),

●Drain the coolant (see “Replacing Coolant” in the “Regular Maintenance” chapter),

●Removing:

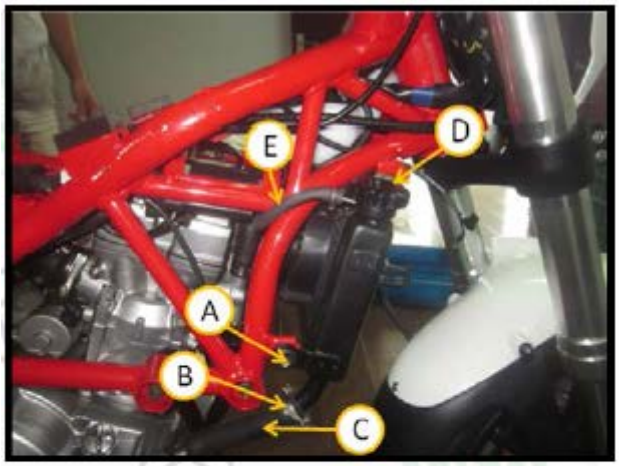
Radiator lock bolt [A] at the lower side,

Outlet hose clamp of engine [B],

Outlet hose of engine [C],

Radiator mounting bolt [D] at the upper side,

Reserve tank hose [E]



●Removing:

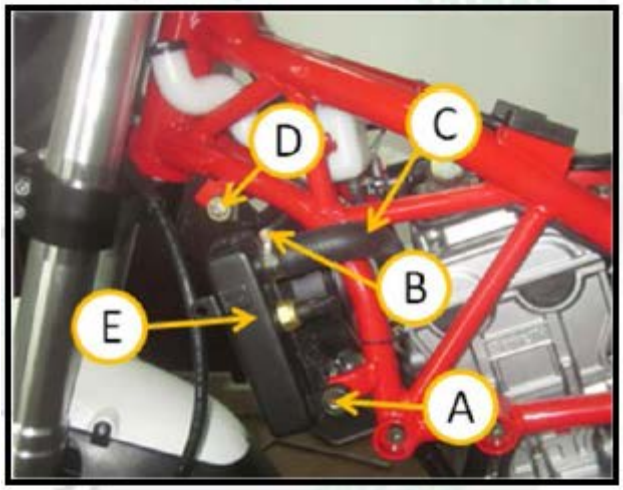
Radiator lock bolt [A] at the lower side,

Inlet hose clamp of engine [B],

Inlet hose of engine [C],

Radiator mounting bolt [D] at the upper side

Radiator [E]

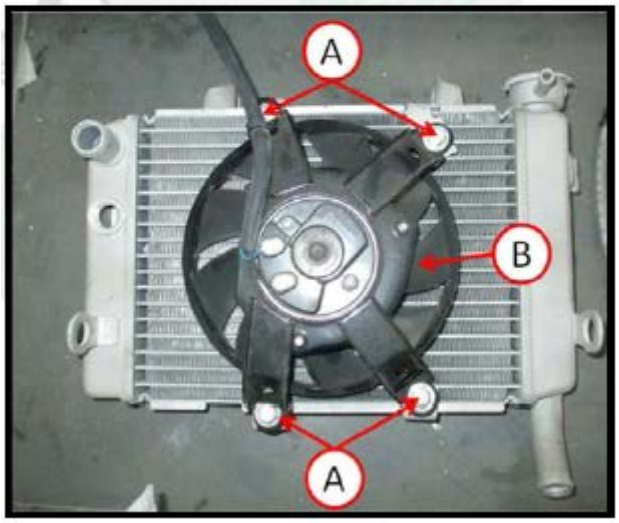


Note
Do not touch the radiator fins, otherwise the radiator fins will be damaged and the cooling efficiency will be reduced.

●Removing:

Radiator fan mounting bolt [A]

Radiator fan [B]



Installing Radiator and Radiator Fan

●Arrange the radiator fan leads properly (see the section in the "Appendix" chapter: Winding Method of Cable, Wire and Hose").

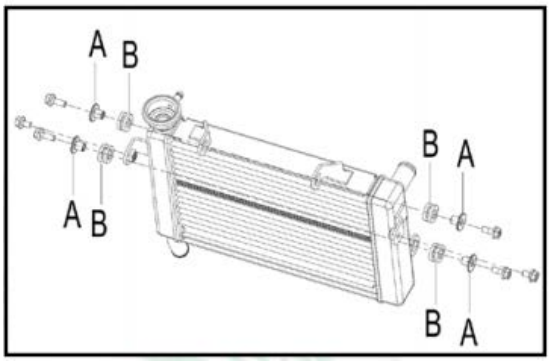
●Install the radiator bracket sleeve [A], buffer sleeve [B] and bolt as shown in the figure.

●Install the parts disassembled previously (see the corresponding chapters)

Locking torque of radiator mounting bolt (upper side): 10 N·m

Locking torque of radiator mounting bolt (lower side): 10 N·m

Locking torque of lock screw of radiator hose (coolant hose): 2.0 N·m



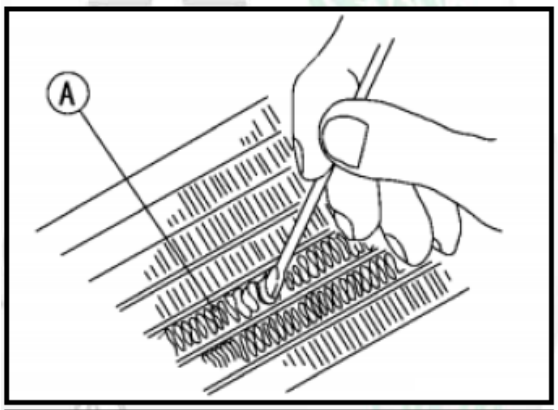
Checking Radiator

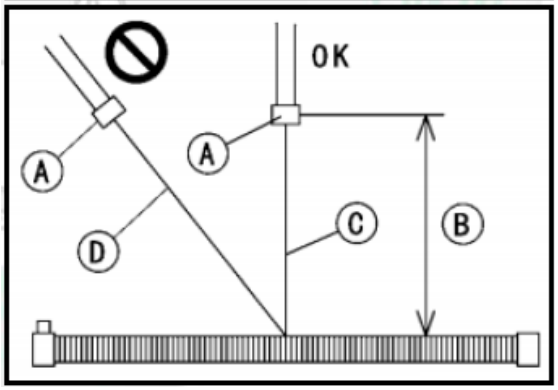
●Check the radiator fins.

★If there are obstacles which block the air flowing, please clear them!

★If the radiator fins [A] are deformed, straighten them carefully.

★If the obstacle that cannot be cleared or the radiator fin that cannot be repaired blocks 20% or above air duct of radiator, repair the radiator with a new one.



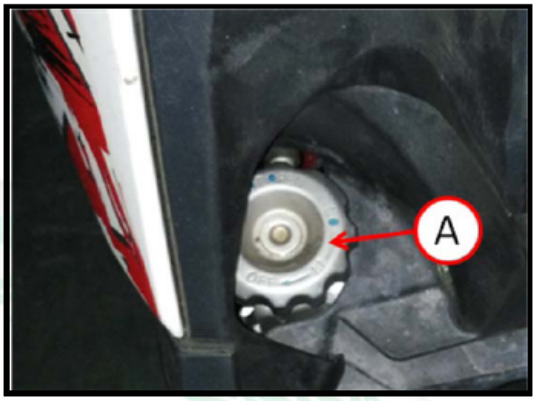


Note
To avoid damaging the radiator, the following precautions shall be followed when cleaning the radiator with a steam cleaner: **The distance between the steam gun [A] and radiator fin shall be kept at 0.5 m [B] or above.** **Hold the steam gun so that it is vertical [C] (do not tilt [D]) to the surface of radiator fin.** **Use the steam gun depending on the direction of cooling fin of radiator.**

Checking Radiator Cap

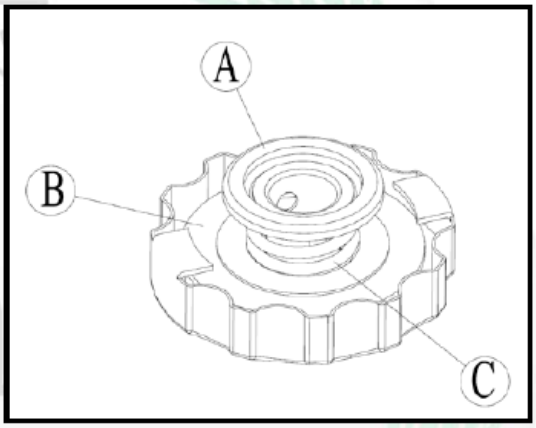
●Removing:

Radiator cap [A]



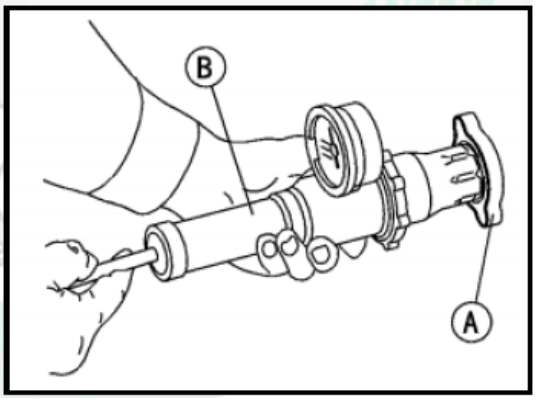
●Check the base [A], top [B] valve sealing and valve spring [C].

★If any one of above parts is broken, replace with a new radiator cap.



●Install the cap [A] on the pressure meter [B] of cooling system.

Remark
○*Wet the sealing surface of radiator cap with water or coolant to prevent pressure leakage.*



●Observe the pressure meter, inflate the pressure meter and increase the pressure until the relief valve is opened: the pointer of pressure meter flicks downward. Stop inflating and measure the pressure valve during the air leakage immediately. The relief valve must be opened within the range specified in the table below. In addition, the pointer of pressure meter must stay within this range for at least 6 seconds.

Radiator cap releases the pressure

Standard: 93-123 kPa

★If the radiator cap cannot maintain the specified pressure or excessive pressure, replace the radiator cap with a new one.

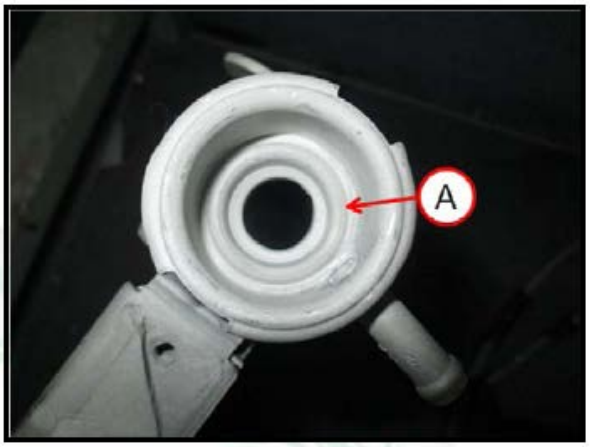
Checking Radiator Filler

●Removing:

Radiator Cap

●Check whether the radiator filler is damaged.

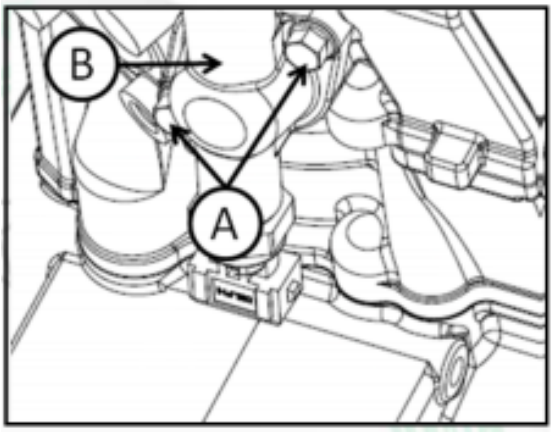
●Check the top seal sleeve and bottom seal sleeve [A] inside the filler. The top seal sleeve base and bottom seal sleeve base must be smooth and clean so as to ensure the normal operation of radiator cap.



Thermostat

Disassembling Thermostat

●Drain the coolant (see “Replacing Coolant” in the “Regular Maintenance” chapter);
●Remove the radiator fairing (see “Disassembling Radiator Fairing” in the “Frame” chapter),
●Remove the radiator (see “Disassembling Radiator” in the “Radiator” chapter),
●Removing Bolt [A],
Thermostat [B],

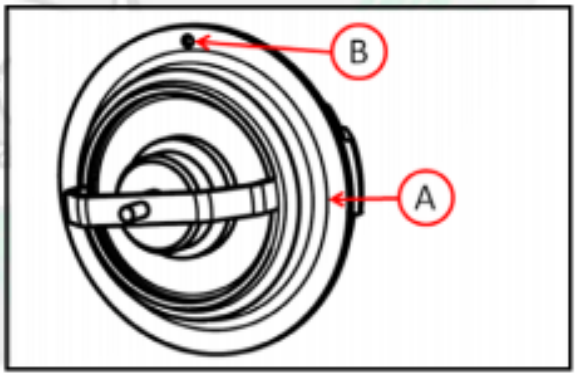


●Removing:
Thermostat

Note
Carry out these steps when the engine is cool

Installing Thermostat

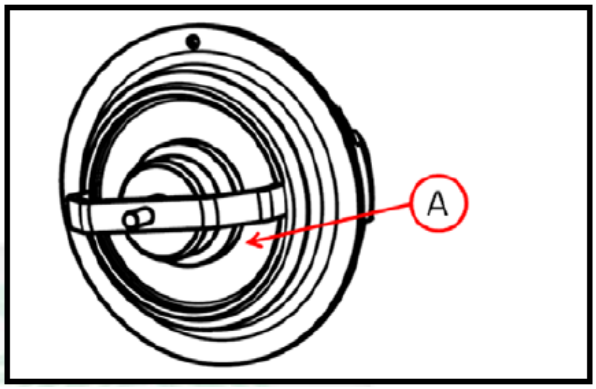
●The exhaust valve hole [B] shall be at the top when installing the thermostat [A] inside the outer cover.
●Install a new O-ring seal into the outer cover.
Locking torque of thermostat cap mounting bolt: 9.8 N·m
●Install the coolant hose and tighten the lock screw.
Locking torque of radiator hose (coolant hose) lock screw: 2.0 N·m
●Fill the radiator with coolant (see “Replacing Coolant” in the “Regular Maintenance” chapter);



Checking Thermostat

●Remove the thermostat (see “Disassembling Thermostat”) and check the thermostatic control valve [A] in indoor temperature.

★If the valve is open, a new thermostat is required.

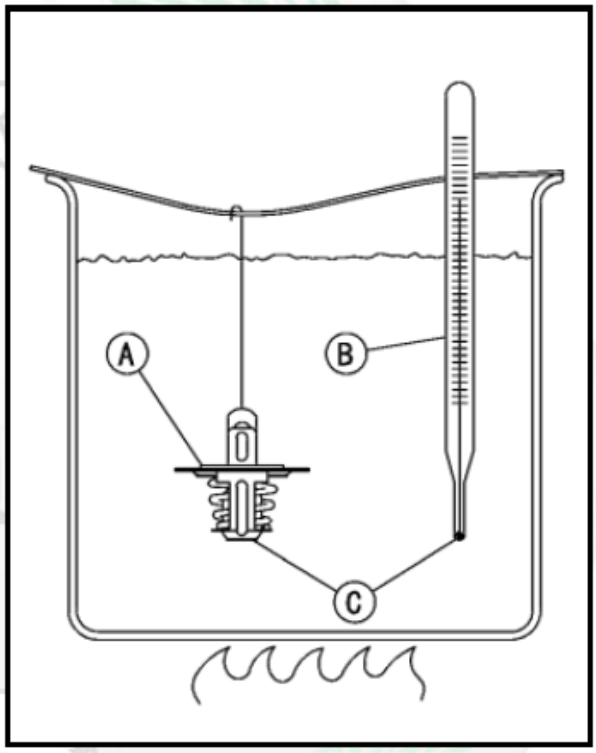


●To measure the valve opening temperature, the thermostat [A] shall be hung in a container filled with water, and then raise the water temperature.

○The thermostat must be completely immersed in water and cannot touch the inside wall or bottom of the container. Suspend an accurate thermometer [B] in the above container filled with water and ensure that the immersion depth of the sensing temperature part of thermometer is substantially the same as that of the sensing temperature part of thermostat. The thermometer cannot touch the inside wall or bottom of the container.

★When the temperature reaches 75℃, the thermostatic valve will open; when the temperature reaches 90℃, the thermostatic valve will open at least 7 mm

★ If the measurement results exceed the following specified temperature range, replace the thermostat with a new one.



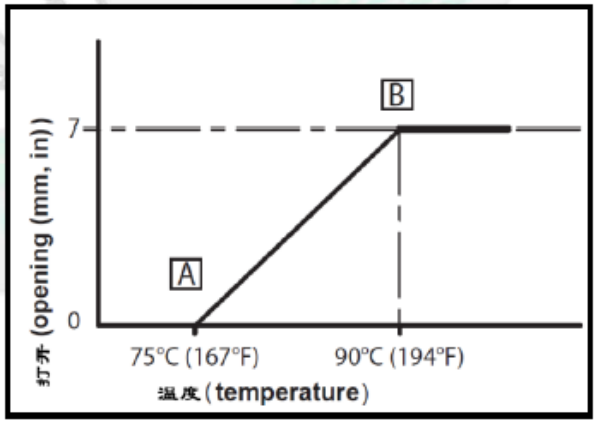
Thermostat valve opening temperature:

75°~ 90℃

Thermostat opening/closing graph

A Completely closed

B Completely open



Note
A damaged thermostat will cause serious overheating or supercooling of engine.

Hose and Pipeline

Installing Hose

●Install the hose and pipeline and pay attention to the bending direction of hose and pipeline. Avoid over bending, kinking, squeezing or twisting.

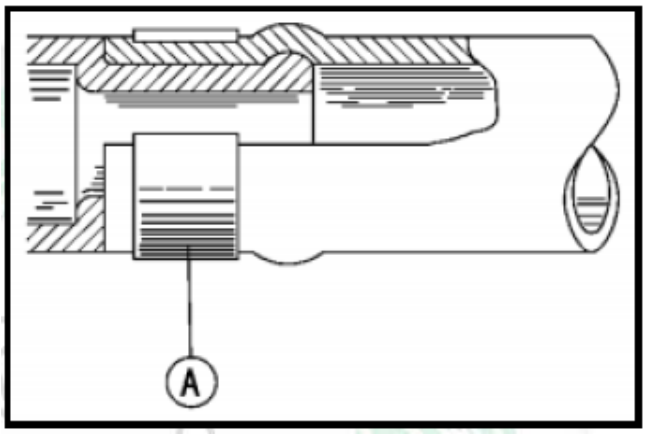
●Arrange the hose (see the section in the “Appendix” chapter: Winding Method of Cable, Wire and Hose”).

●The clamp [A] shall be as close to the hose as possible to protect the end of hose from tilting and prevent the hose from loosening.

○Make sure that the position of lock screw is correct to prevent the clamp from touching other parts.

The radiator hose (coolant hose) clamp touches the other parts.

Locking torque of lock screw: 2.0 N·m



Checking Hose

●See “Checking Radiator hose” in the “Regular Maintenance” chapter.

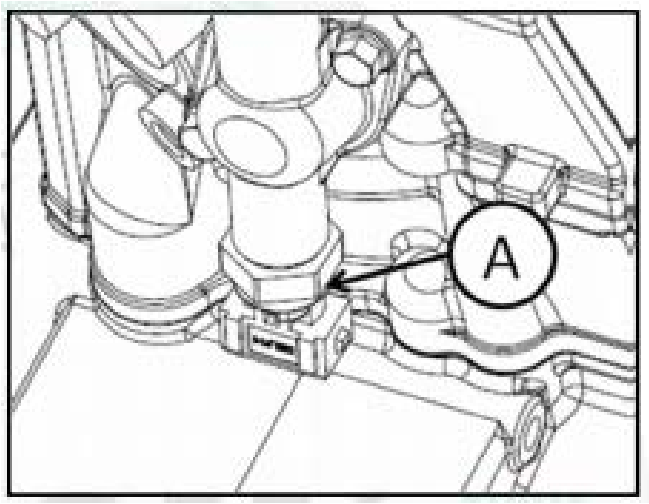
coolant Temperature Sensor

Note
Do not drop the coolant temperature sensor on a hard surface, otherwise the coolant temperature sensor will be damaged.

Disassembling/Installing coolant Temperature Sensor

●Disassemble the radiator (see “Radiator”—“Disassembling Radiator”).

●Disassemble the coolant temperature sensor [A]



●Install the parts disassembled previously (see the corresponding chapters).

Locking torque: 20-25 N·m

Checking coolant Temperature Sensor

●See “Engine coolant Temperature Sensor” in the Fuel Injection System (EFI) chapter.

CHAPTER V ENGINE

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Lubrication System

Preparation Information

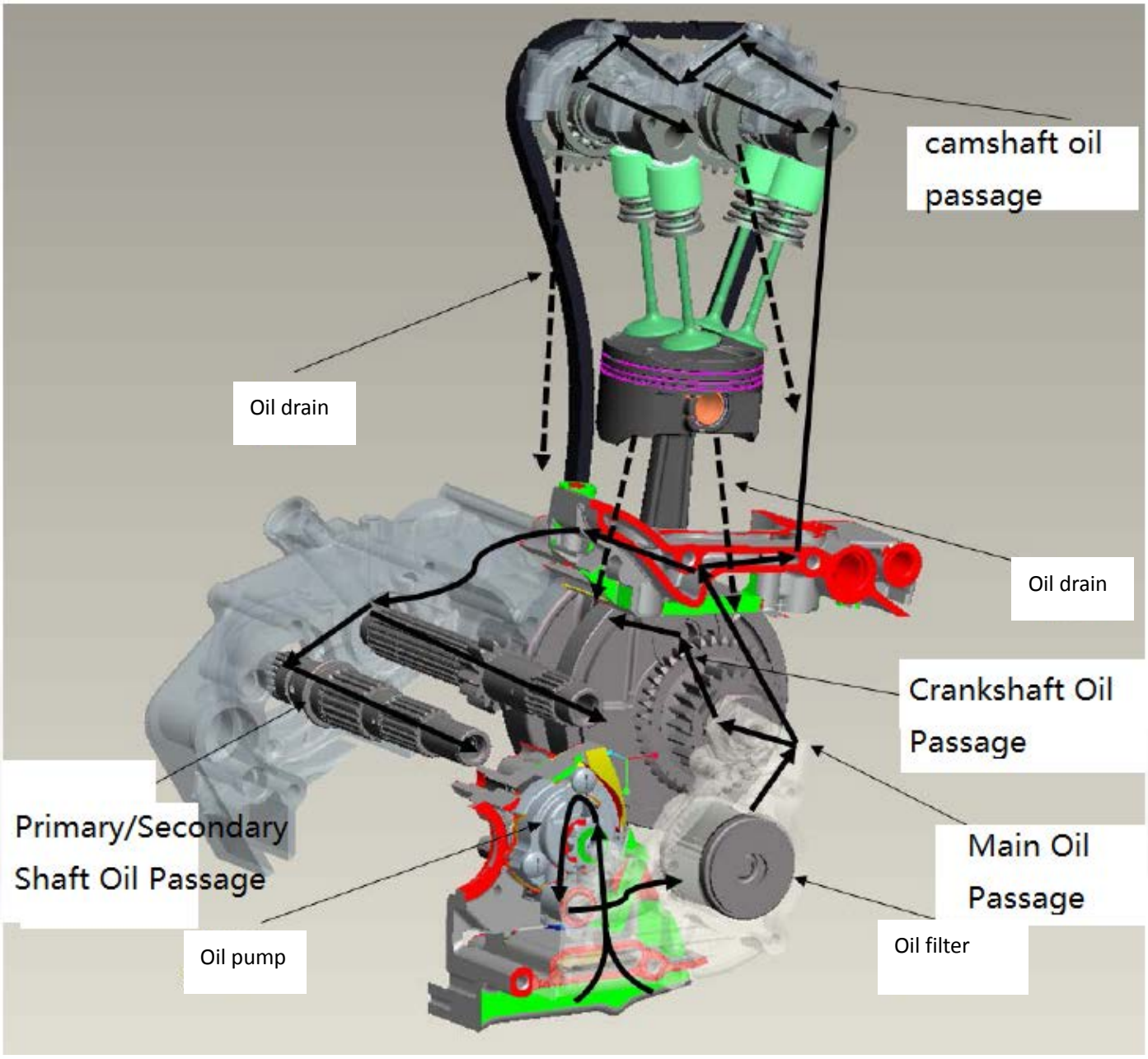
Function of lubrication system:

The function of engine lubrication system is to supply lubricant to the friction surface of parts to make the dry friction of surface become the liquid friction among the particles of the lubricant so as to reduce the wear of parts; cool the parts with higher thermal load; absorb the impacts of bearing and other parts and reduce noise; increase the sealing between piston ring and cylinder wall; clean and remove the impurities on the surface of engine parts.

Operation Precautions:

After the oil pump is disassembled, carefully clean the parts and blow the surfaces of engine parts with high-pressure gas. When disassembling the oil pump, take care not to drop foreign materials into the crankcase.

Oil passage Diagram



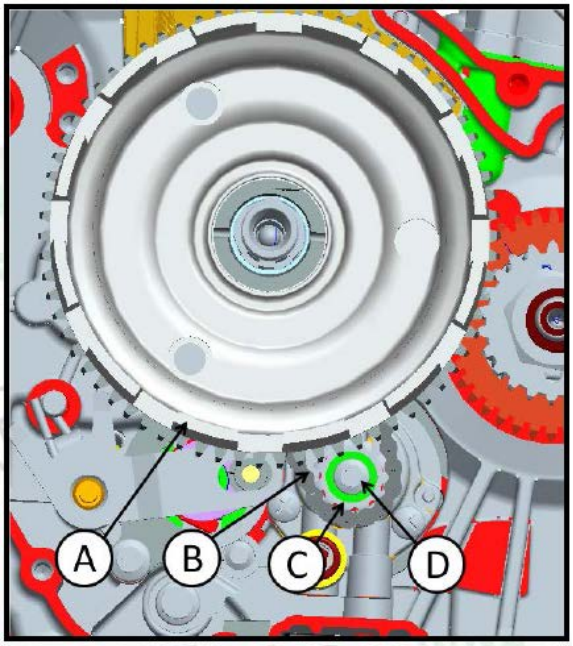
Technical Parameters

Item	Standard	Use limit
Oil capacity :		
When replacing oil	1.2±0.05L	__
When disassembling	1.5±0.05L	__
Oil pump rotor:		
Radial clearance between inner and outer rotors	0.05-0.13mm	0.15mm
Clearance between outer rotor and oil pump body	0.10-0.16mm	0.2mm

Oil Pump

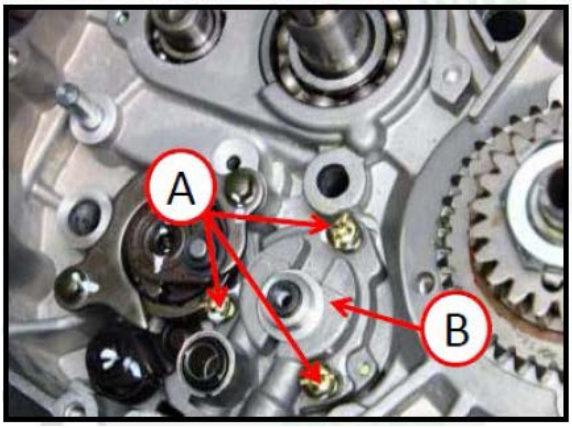
Oil Pump Disassembly

●Loose the oil pump mounting bolt [D] and remove the roller sprocket [D] on the oil pump, oil pump chain [B] and clutch shell component [A]

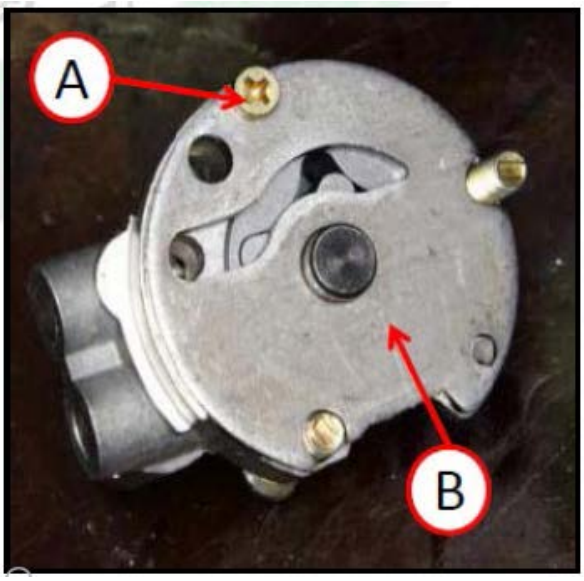


●Remove the screw [A].

●Remove the oil pump [B].



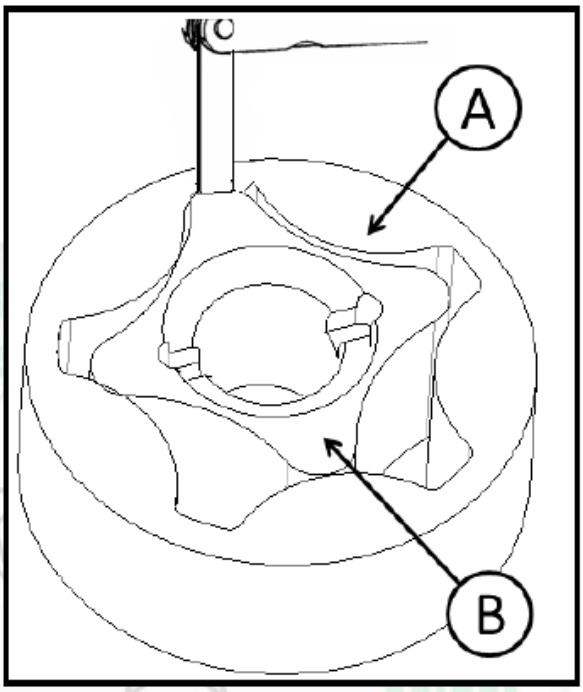
●Disassemble the screw [A], remove the oil pump cover and decomposition the oil pump [B].



Checking Oil Pump

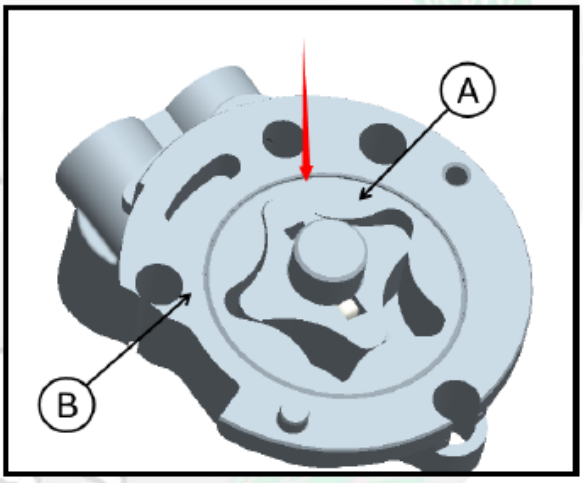
●Check the radial clearance between outer rotor [A] and inner rotor [B].

Service limit: 0.15mm.



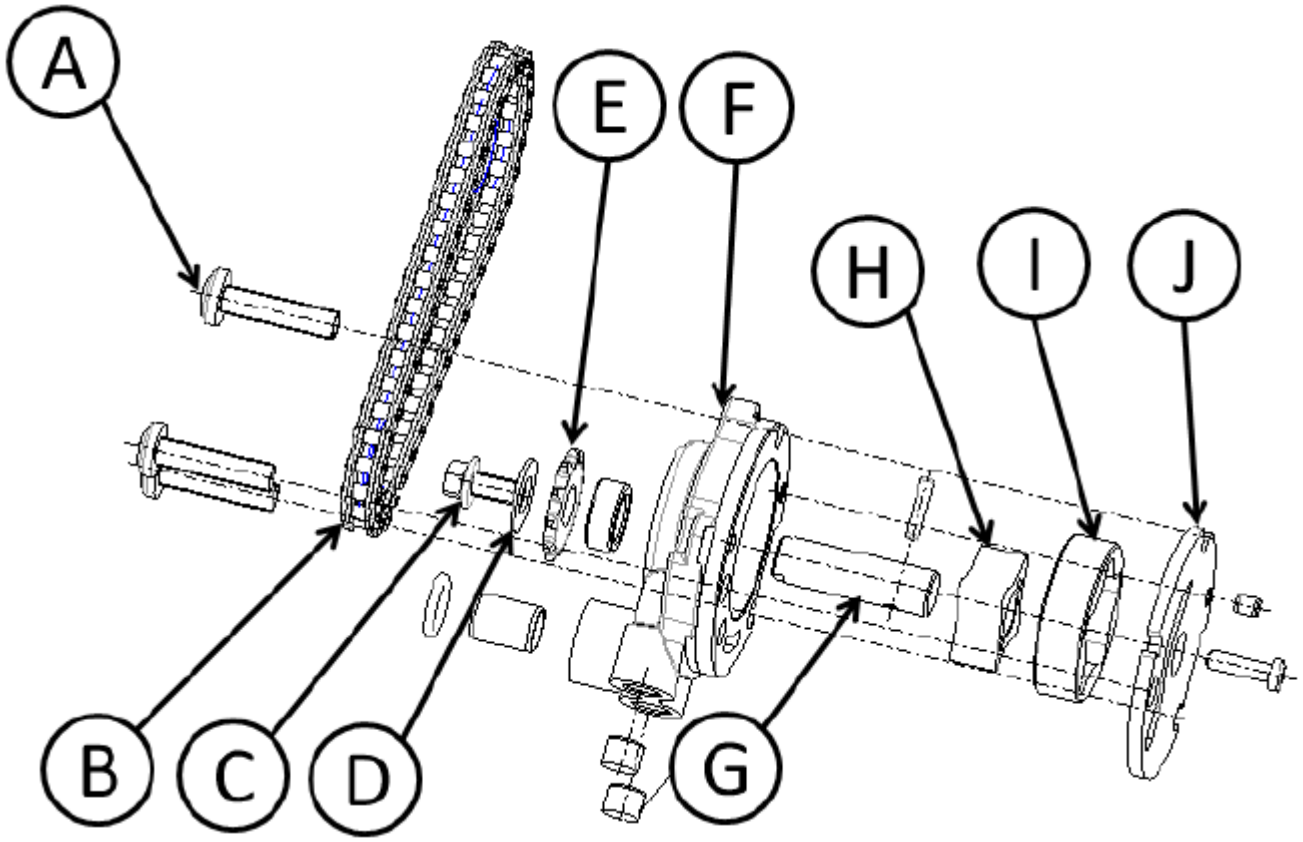
●Check the clearance between outer rotor [A] and oil pump cover [B].

Service limit: 0.20mm.



Installing Oil Pump

●The assembly of oil pump is shown below



Screw [A]
Chain [B]
Screw [C]
Gasket [D]
Roller sprocket [E]
Oil pump body [F]
Oil pump shaft [G]
Innerrotor[H]
Outer rotor[I]
Oil pump cover [J]

Note:
After the assembly, the inner and outer rotors shall rotate flexibly without clamping stagnation.

●Install the parts disassembled previously and see the relevant chapters.

Tightening torque:

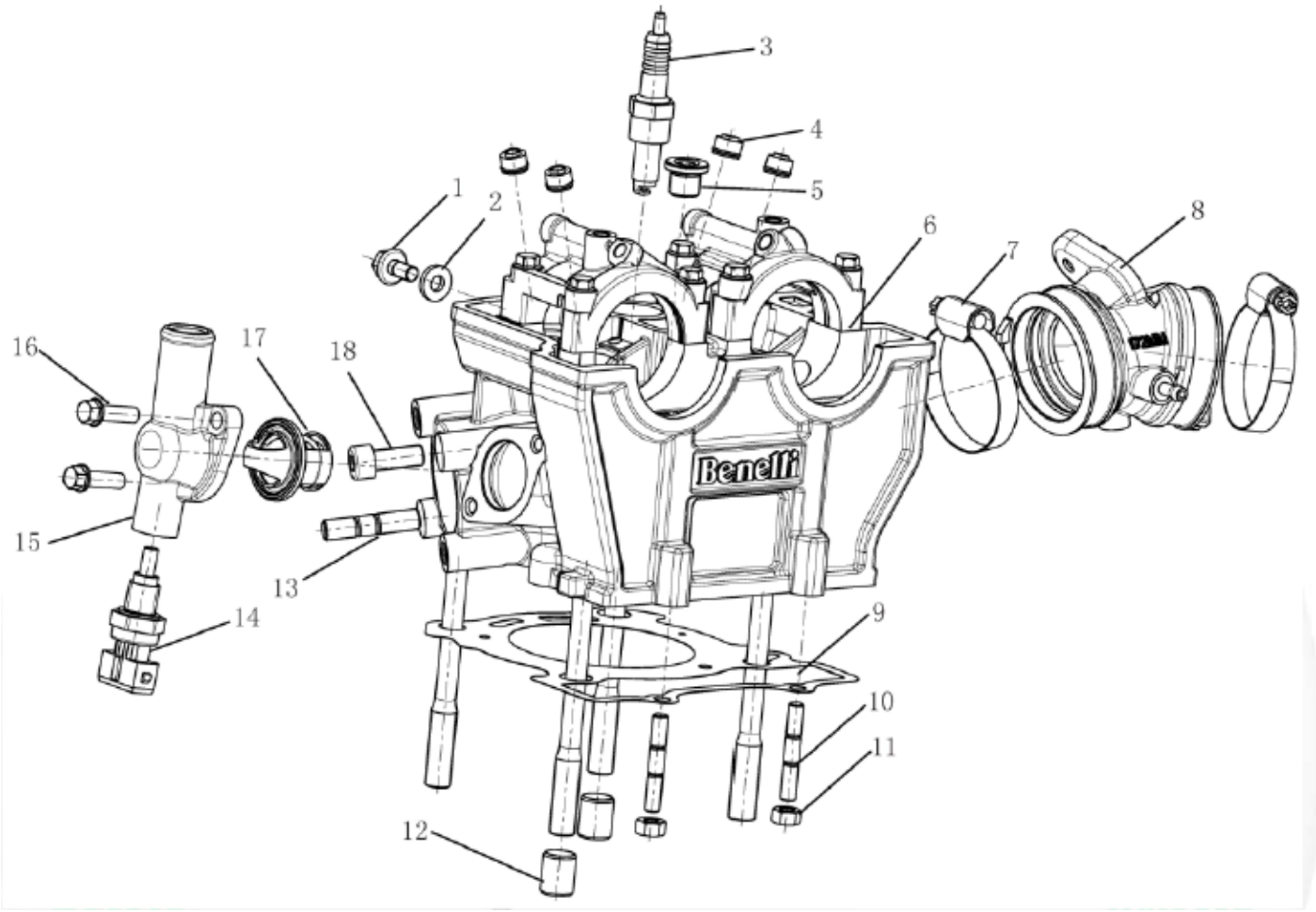
Fixing screw of roller sprocket: 10N·m

Fixing screw of oil pump cover: 10N·m

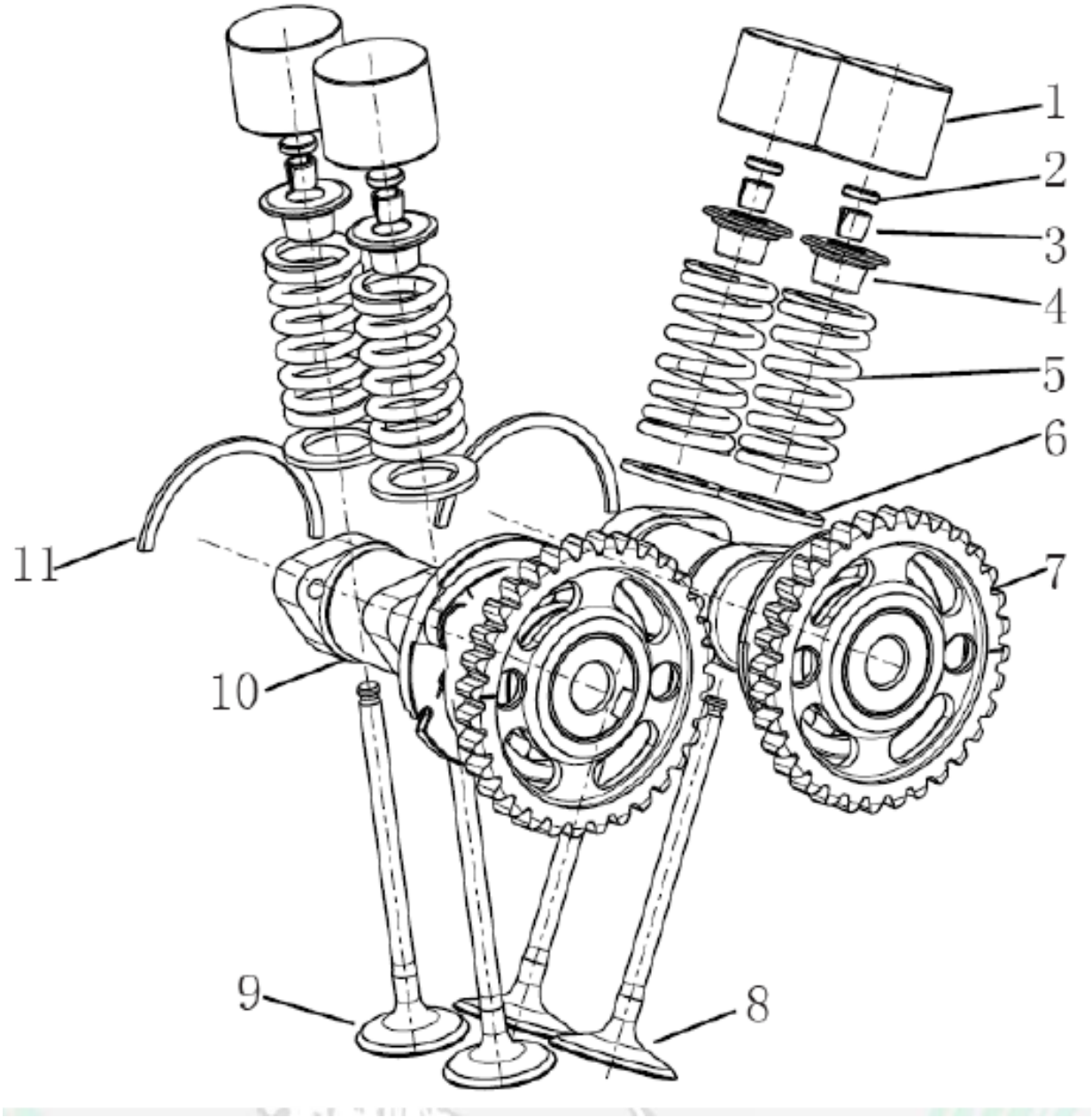
Fixing screw of oil pump: 10N·m

Cylinder Head

Cylinder Head Exploded View



Camshaft and Valve Exploded View



Preparation Information

Function of Cylinder Head:

Cylinder head is used to seal the cylinder and it forms a combustion chamber with the piston to withstand the high temperature and high pressure gas. And it can also complete the intake and exhaust through the valve mechanism.

Operation Precautions:

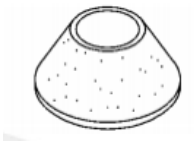
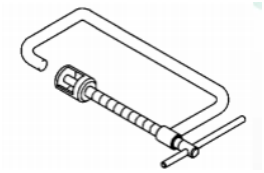
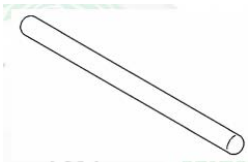
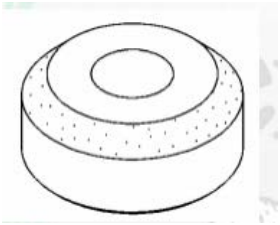
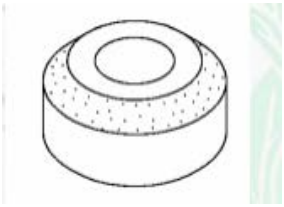
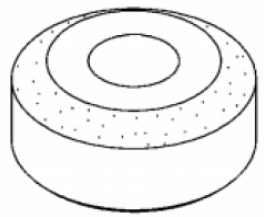
In order to ensure the sealing of cylinder head and crankcase, the cylinder head withstands great bolt tightening torque. Tighten the bolt by three times, 15NM for the first, 30NM for the second and 90 NM for the third

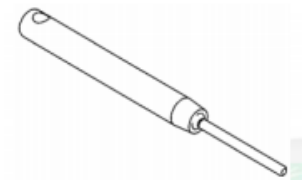
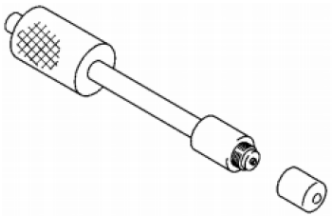
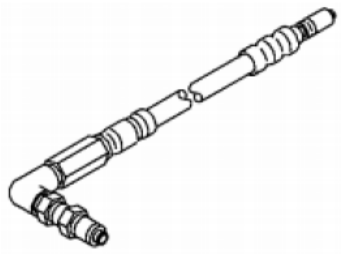
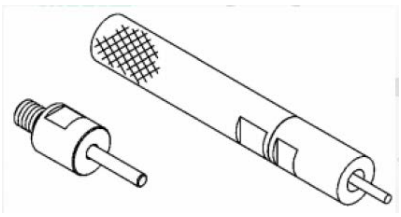
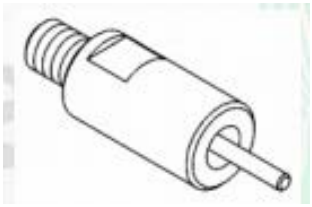
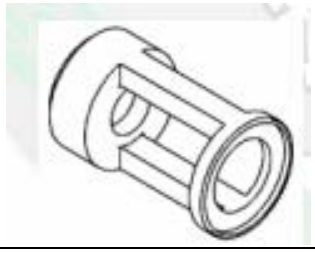
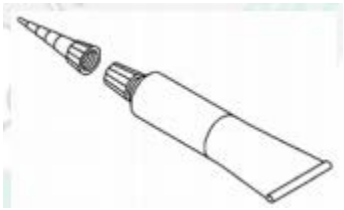
Before the inspection and measurement, all parts shall be cleaned and blown with high-pressure air.

Technical Parameters

Item	Standard	Use limit
Planeness of cylinder head	0.03mm	0.05mm
Valve and valve guide		
Valve clearance:		
Intake	0.13-0.15 mm	__
Exhaust	0.13-0.15 mm	__
Outer diameter of valve guide :		
Intake	4.465-4.475 mm	4.455 mm
Exhaust	4.465-4.475 mm	4.455 mm
Inner diameter of valve guide :		
Intake	4.5-4.512 mm	4.54 mm
Exhaust	4.5-4.512 mm	4.54 mm
Clearance between valve stem and valve guide :		
Intake	0.025-0.047 mm	0.09 mm
Exhaust	0.025-0.047 mm	0.09 mm
Width of valve seat:		
Intake	1-1.2 mm	1.5 mm
Exhaust	0.9-1.1 mm	1.4 mm
Valve spring		
Free length:		
Intake	37 mm	36 mm
Exhaust	37 mm	36 mm
Camshaft		
Fit clearance between camshaft and cylinder head	0.04-0.074 mm	0.1 mm

Special Tools and Sealant

Pressure meter 20 kgf/cm^2:	**Valve seat cutter 60°:**
	
Valve spring compressor assembly:	**Valve seat cutter fixer rod:**
	
Valve seat cutter 45°:	**Valve seat cutter 45°:**
	
Valve seat cutter 32°:	**Valve guide mandrel:**
Valve seat cutter 32°:	**Valve guide reamer:**
	

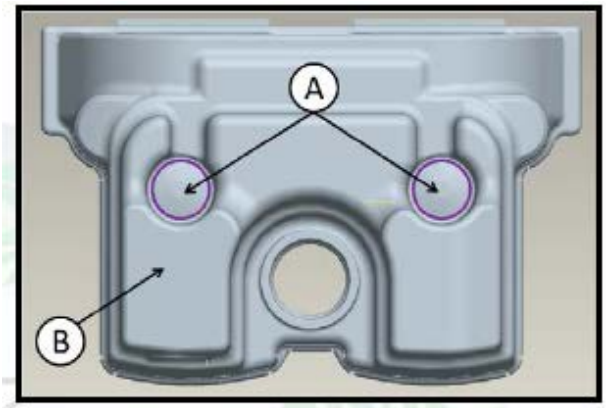
Valve seat cutter fixer:	**Pressure meter adaptor:**
	
Valve seat cutter 60°:	**L-hose:**
	
Valve guide driver:	**Valve guide driver Attachment E:**
	
Valve spring compressor adaptor:	**Adhesive:**
	
Valve oil seal compressing fixture:	

Cylinder Head

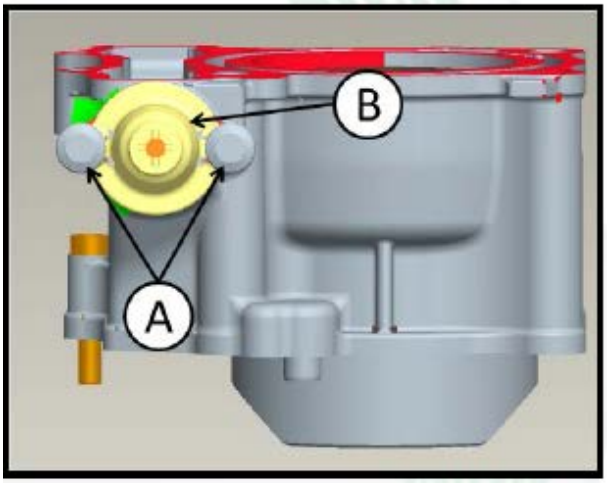
Disassembling Cylinder Head

●Remove the ignition coil.

●Loosen the fastening bolts [A], take the gasket and remove the cylinder head cover [B].

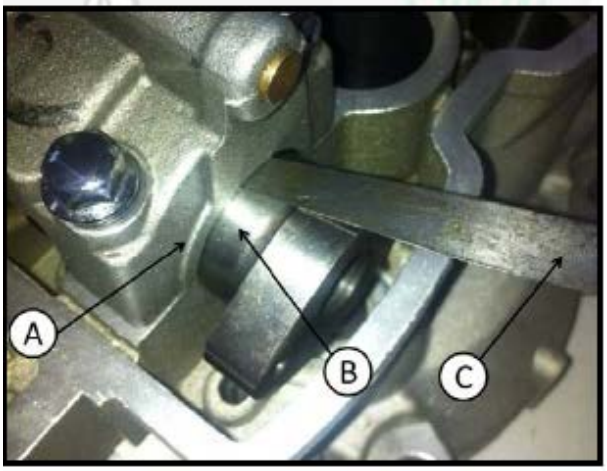


●Loosen the fastening bolt [A] and remove the chain tensioner [B].

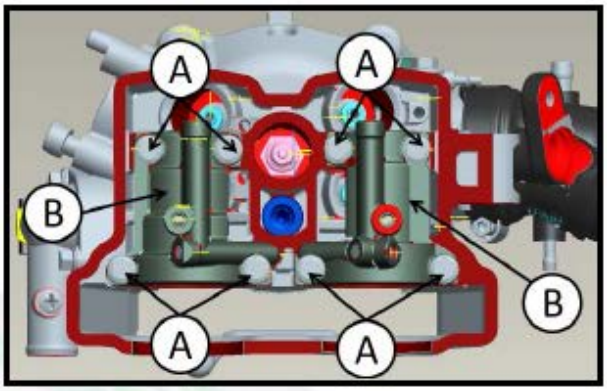


●Measure the fit clearance between cylinder head [A] and camshaft [B] with a thickness gauge.

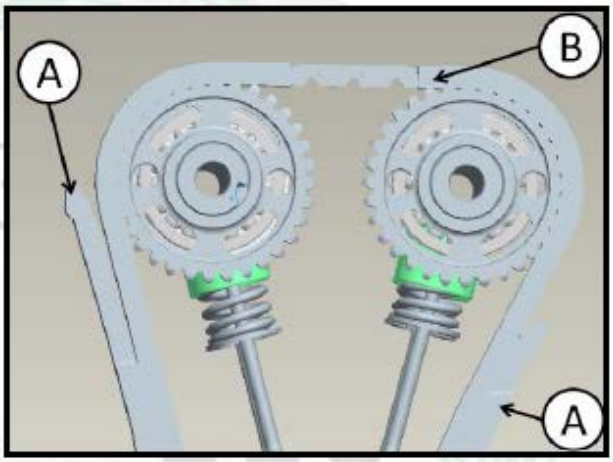
Service limit: 0.1mm.



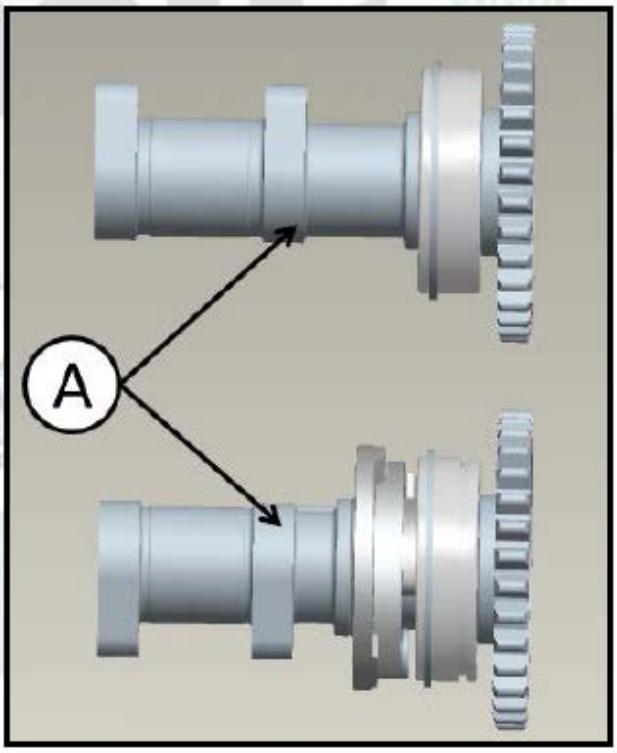
●Loosen the camshaft support lock screw [A] and remove the camshaft support [B] and camshaft stopper collar.



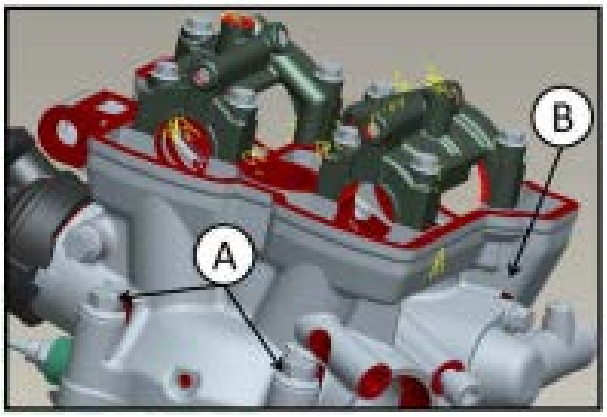
●Remove the chain guide and chain



●Remove the camshaft.



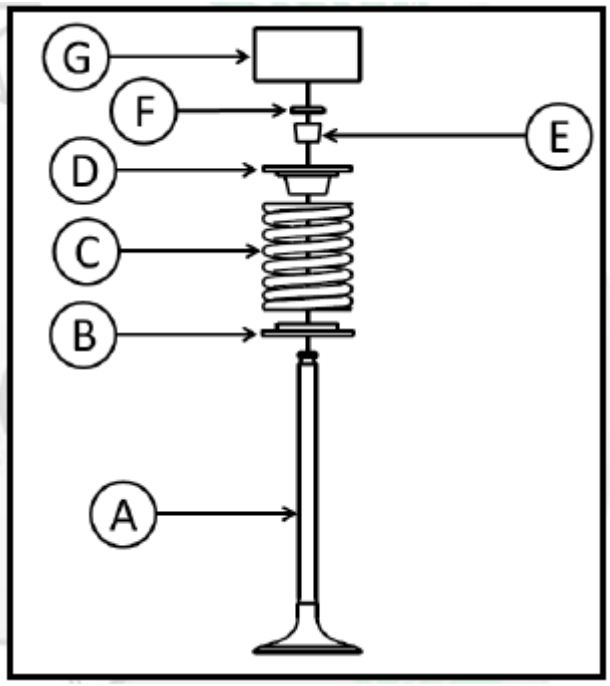
●Loosen the cylinder head bolt [A].
●Remove the cylinder head [B].



●Remove the Valve lifter, compress the valve spring with the valve spring compression tools and remove the valve cotter.
●Take the valveshim, valve spring, upper and lower valve spring seats and valve.

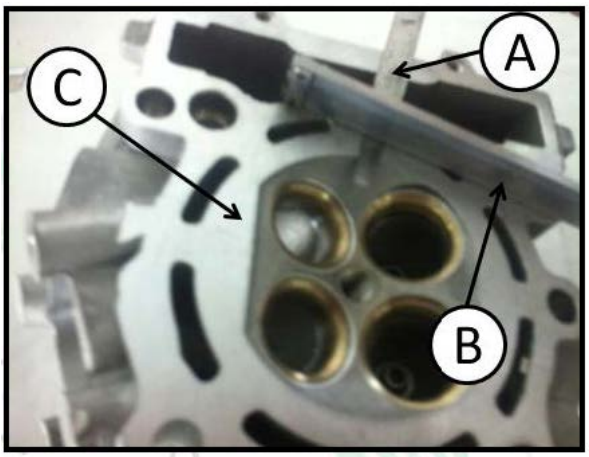
Valve Decomposition

Valve [A]
Lower valve spring seat [B]
Valve Spring [C]
Upper valve spring seat [D]
Valve cotter[E]
Valve shim [F]
Valve lifter [G]



Checking Combustion Chamber

●Check the combustion chamber and clear the carbon deposits in the combustion chamber.



Checking Cylinder Head Joint Surface

●Measure the planeness of cylinder head joint surface [C] with a thickness gauge [A] and straightedge [B].

Service limit: 0.05mm.

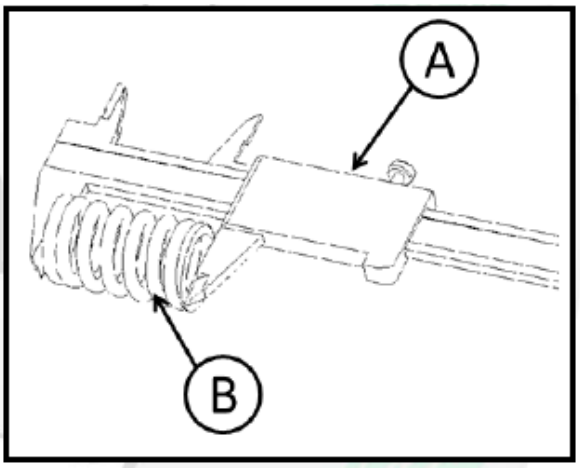
★When the planeness of cylinder cover joint surface exceeds the use limit, put the fine sandpaper on the plate so that the cylinder head joint surface fits the sandpaper, and then push and grind them in 8-shape.

Checking Intake and Exhaust Springs

●Measure the free length of intake valve and exhaust valve springs [B] with caliper [A].

Service limit: intake spring: 36mm.

Exhaust spring: 36mm.



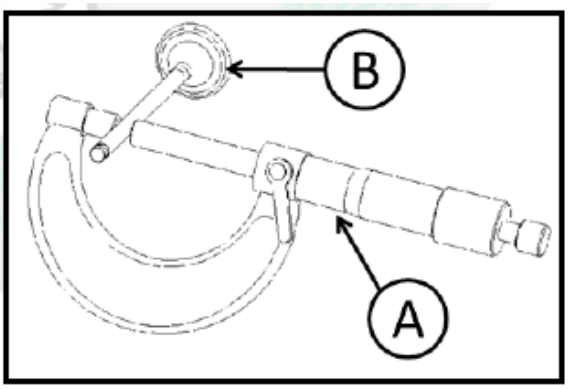
Checking Valve stem

●Measure the outer diameter of valve stem [B] with a micrometer [A].

Service limit:

intake valve 4.455mm.

Exhaust valve 4.455mm



Checking Valve Guide

●Check the valve guide and remove the carbon deposits in the valve guide with a reamer before check.

Note
Rotate the reamer clockwise and do not rotate the reamer secondaryclockwise.

●Measure the inner diameter of valve guide with a measurement meter [A].

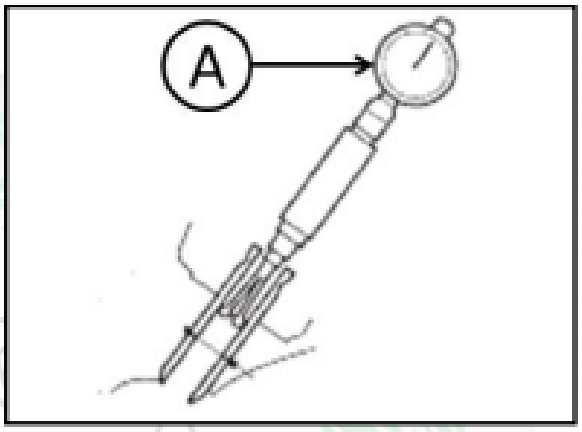
Service limit:

Intake/exhaust: 4.54mm.

Service limit of clearance between valve and valve guide:

Intake valve: 0.09mm.

Exhaust valve: 0.09mm.



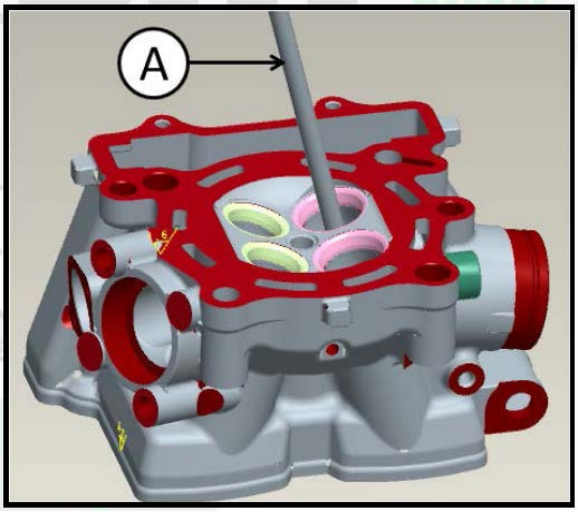
Replacing Valve Guide

Note
If the clearance between valve and valve guide exceeds the limit, replace the valve guide After the valve guide is replaced, the valve seat ring surface must be finished.

●Put the valve guide in the freezing chamber of refrigerator to cool it for an hour.

●Use the electric furnace or oven to heat the cylinder head to 100-150℃.

●Fix the cylinder head and remove the valve guide from the upper side of cylinder head with the valve guide driver [A].

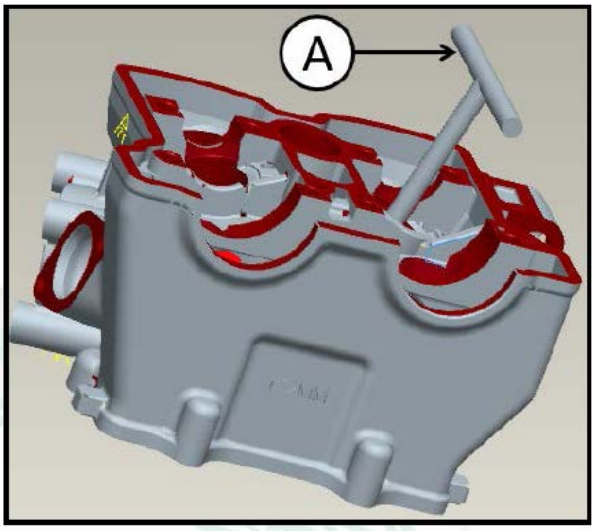


●Put a new O-ring on the new valve guide.

●Install the valve guide from the top of cylinder head.

Note
Do not damage the cylinder head when installing the valve guide .

●After the valve guide is embedded, carry out the finishing by using the valve guide reamer [A].



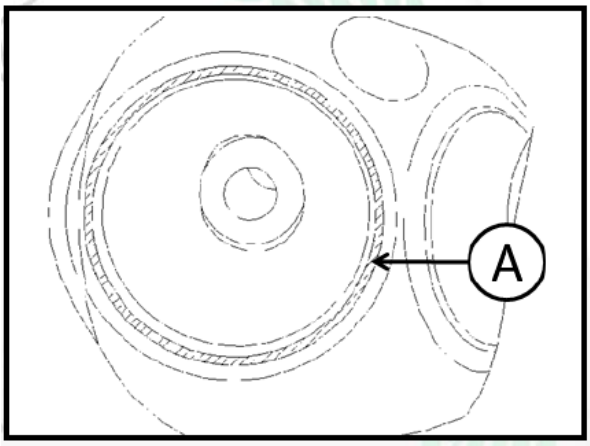
Note
Add an appropriate amount of cutting oil during cutting with a reamer. The reamer shall be rotated clockwise.

● Clean the carbon deposits in the combustion chamber and valve, and thoroughly rinse the intake and exhaust valves.

● Check the width of valve seat contact surface [A].

Service limit: **intake 1.5mm**

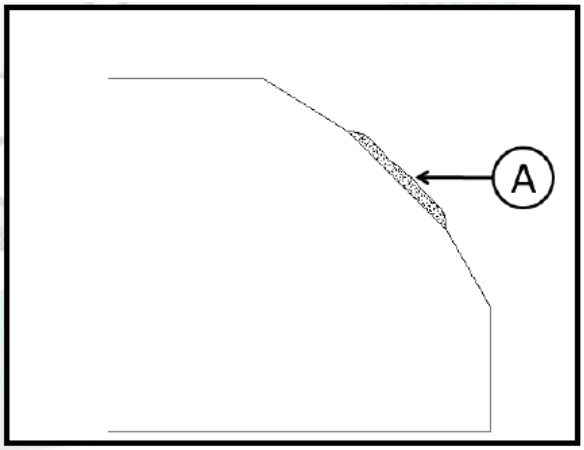
Exhaust 1.4mm



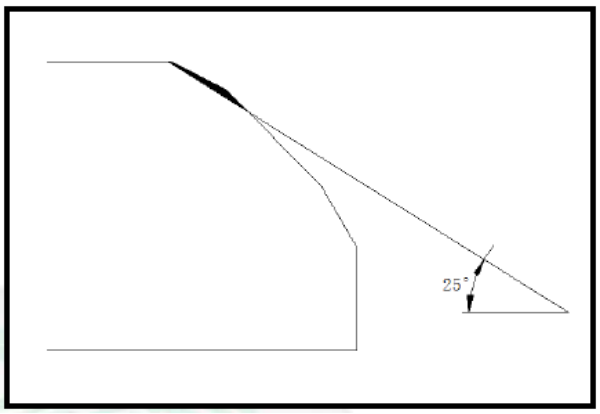
Finishing Valve Seat Ring

●Use a 45°cutter to remove the rough or uneven parts on the surface of valve seat ring [A].

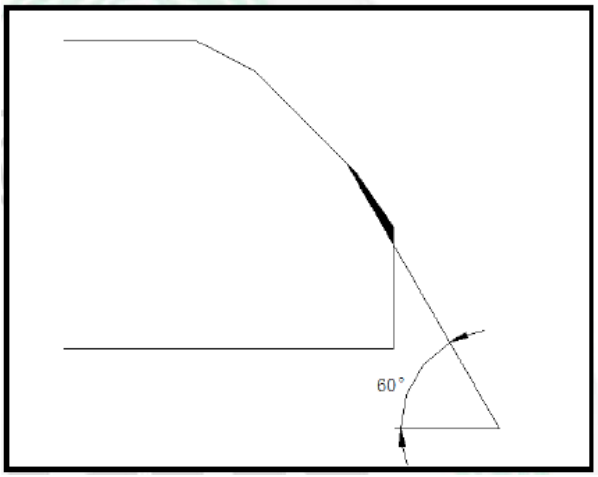
Note
Apply a layer of transparent or Prussia blue coating to the valve seat ring, so that it can be seen more clearly.



●Remove 1/4 of outer end of valve seat ring with a 25° cutter.

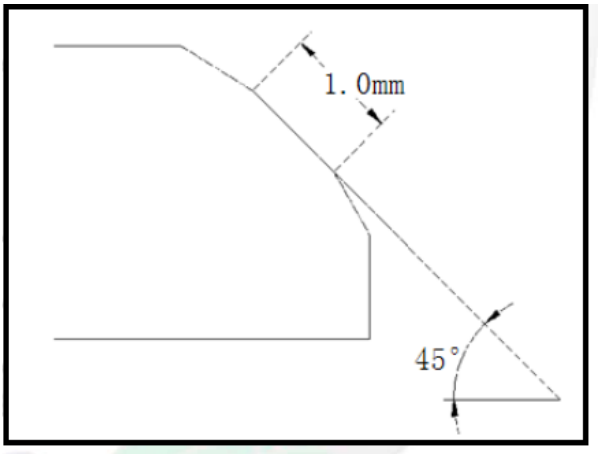


●Remove 1/4 of bottom of valve seat ring with a 60° cutter. Take the cutter and check the positions which have been disposed.

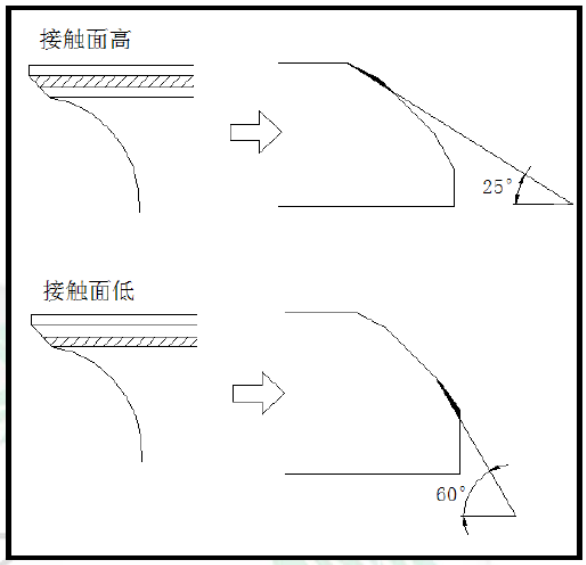


●Grind the valve seat ring with a 45° finishing cutter to reach an appropriate width. Make sure to remove all dents and uneven parts.

Standard valve seat ring width: intake: 1.1mm
Exhaust: 1.0mm



●If the contacted position is in the too high part of valve, please lower the valve seat ring with a 25° flat cutter.
●If the contacted position is in the too low part of valve, raise the valve seat ring with a 60° internal cutter.
●Use the 45° finishing cutter to finish the valve seat ring again to make it meet the required specification.
●After the valve seat ring is grinded, apply polish to the valve surface and gently polish the valve.



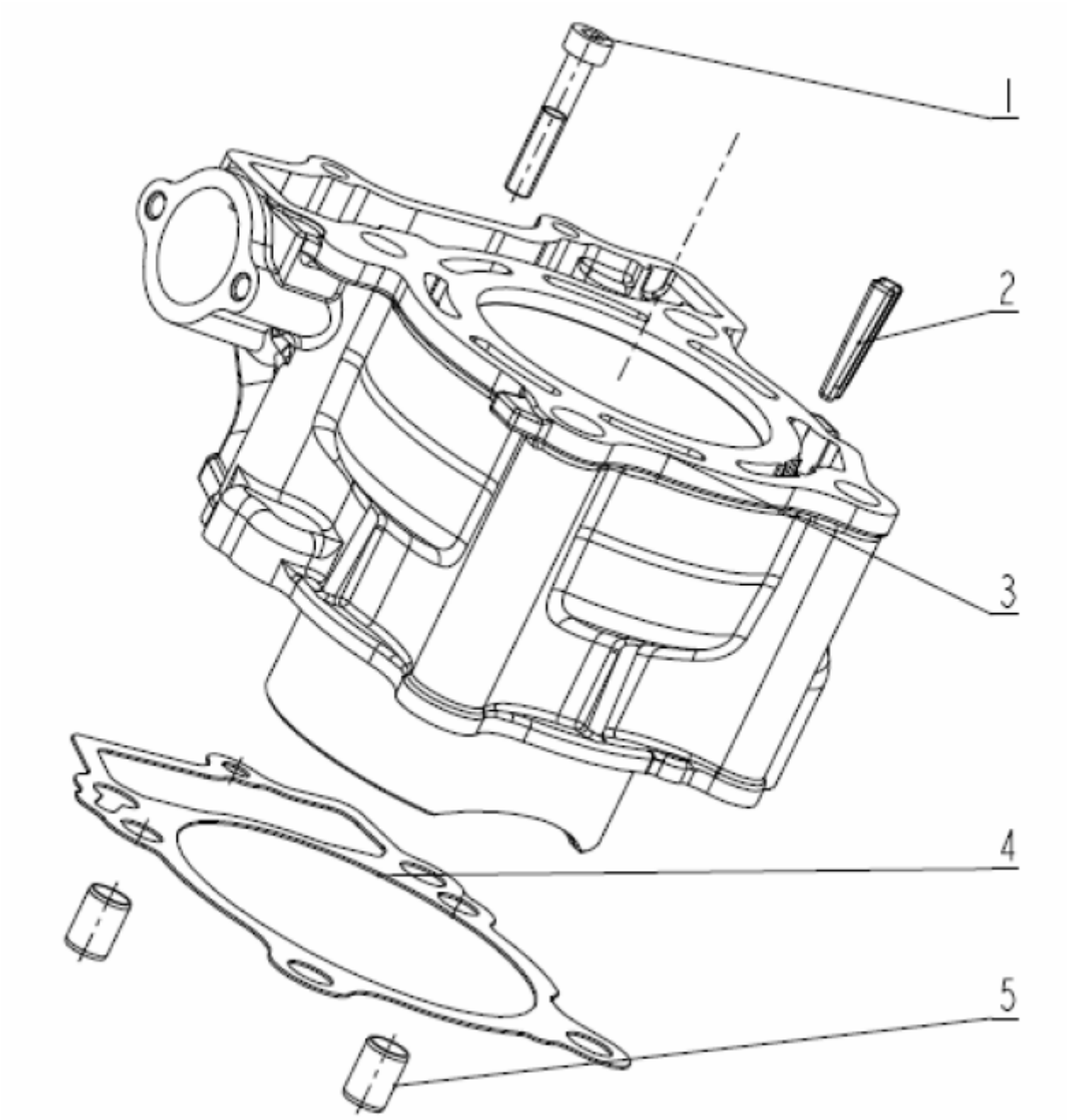
Installing Cylinder Head

●Installation shall be carried out in the order contrary to the disassembly order.

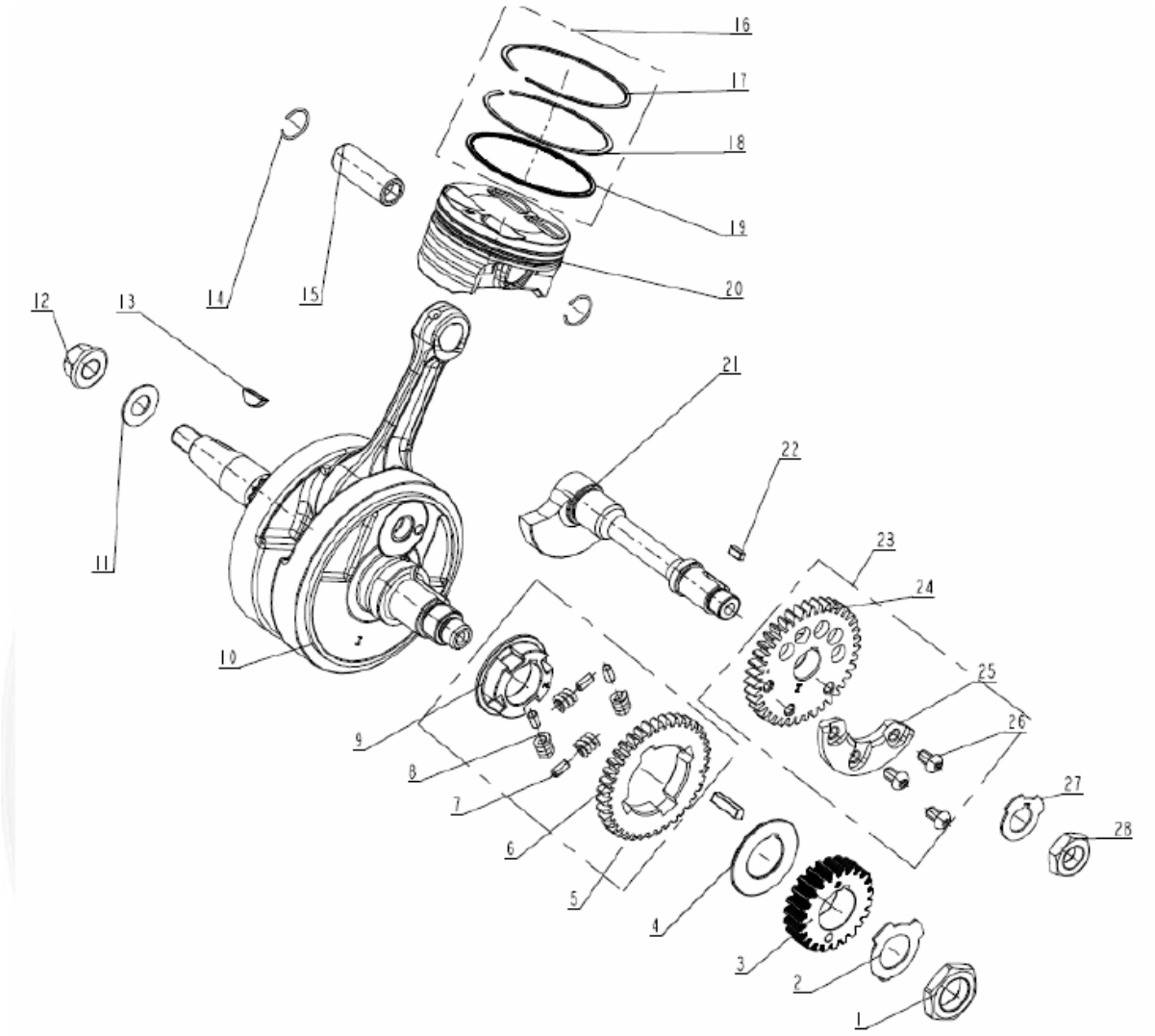
Note
When installing the valve cotter, use the valve spring compression tool to compress the valve spring for installation. **When installing the valve, apply an appropriate amount of oil to the surface of valve stem and then put it into the valve guide .**

Cylinder and Piston

Cylinder Exploded View



Piston, Crankshaft Connecting Rod Exploded View



Preparation Information

Function of Cylinder Block:

The cylinder provides a space to compression, combustion and expansion of gas and plays a guiding role in the piston movement.

It also transfers a portion of heat in the cylinder to the surrounding cooling mediums.

Function of Piston:

1. Withstand the pressure generated by combustion of mixed combustible gas in the cylinder and transmit the pressure to the connecting rod to drive the crankshaft to rotate.

2. The piston, cylinder head and other parts form a combustion chamber.

Function of Piston Ring:

As a metal ring embedded into the piston groove, the piston ring can be divided into two types: compression ring and oil ring. The compression ring can be used to seal the mixed combustible gas in the combustion chamber; the oil ring is used to scrape off the excess oil on the cylinder. The piston ring is a metal elastic ring which can be greatly expended and deformed outwardly and it is installed into the corresponding annular groove on the profile. The reciprocating and rotating piston rings form sealing between the outer circular surface of ring and cylinder and between the ring and one side of ring groove depending on the pressure difference of gas or liquid.

Operation Precaution:

All parts shall be cleaned and blown with high-pressure air before inspection and measurement without any impurities and foreign materials.

Technical Parameters

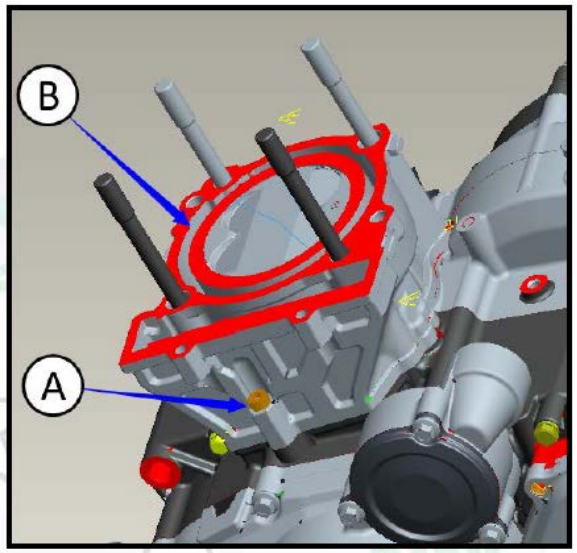
Item	Standard value	Use limit
Cylinder:		
Inner diameter	72.000-72.015 mm	72.02 mm
Cylindricity	-	0.015 mm
Roundness	-	0.015 mm
Planeness	0.02 mm	0.08 mm
Piston:		
Outer diameter of piston (measurement point)	71.94-71.955 mm (8-11mm at the bottom of piston skirt)	71.93 mm
Inner diameter of piston pin hole	16.002-16.008 mm	16.02 mm
Outer diameter of piston pin	15.994-16.000 mm	15.99 mm
Clearance between piston and piston pin	0.002-0.014 mm	0.025 mm
Clearance between piston ring and ring groove:		
First ring	0.03-0.07 mm	0.09 mm
Second ring	0.03-0.07 mm	0.09 mm
Piston ring joint clearance		
First ring	0.15-0.30 mm	0.4 mm
Second ring	0.20-0.35 mm	0.4 mm
Oil seal	0.20-0.70 mm	-
Connecting rod:		
Inner diameter of connecting rod small end	16.020-16.034 mm	16.04 mm
Clearance between connecting rod and piston pin	0.020-0.04 mm	0.05 mm

Cylinder Checking and Replacement

Disassembling Cylinder

●Remove the parts above the cylinder head and loosen the cylinder mounting bolt [A].

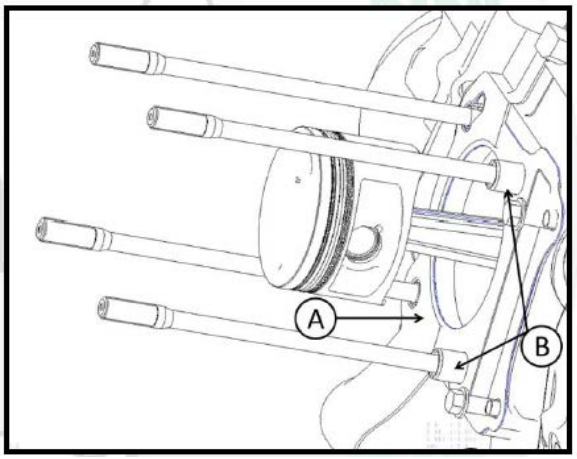
●Remove the cylinder [B] vertically.



●Removing

Gasket [A]

Dowel pins [B]



Installing Cylinder

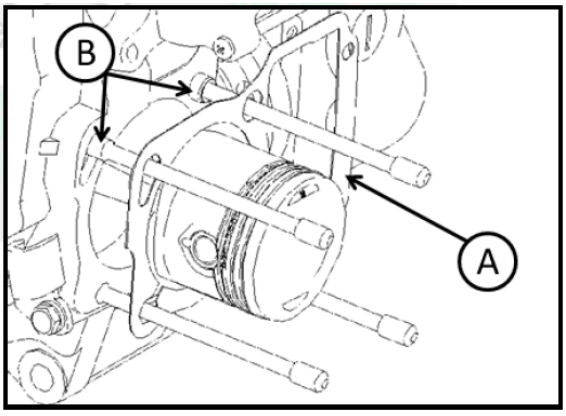
●Install the gasket [A] and dowel pin [B] on the crankcase.

★The wrinkle and unevenness are not allowed to appear on the gasket

★Dislocation is not allowed; apply a little oil to the inside of cylinder and then embed the piston into it. Shake the cylinder horizontally and vertically so that the piston is fully embedded into the cylinder. And then press down it until it is in place. Then install the cylinder gasket.

●Make sure to apply engine oil onto the inner wall of cylinder evenly.

●Be careful to put the piston ring into the cylinder. The assembly shall be smooth; if the stagnation occurs, do not vigorously install it and check whether the piston ring is dislocated.



Note
Do not damage the piston ring. Crankshaft can rotate flexibly after the piston ring is installed

Checking Cylinder

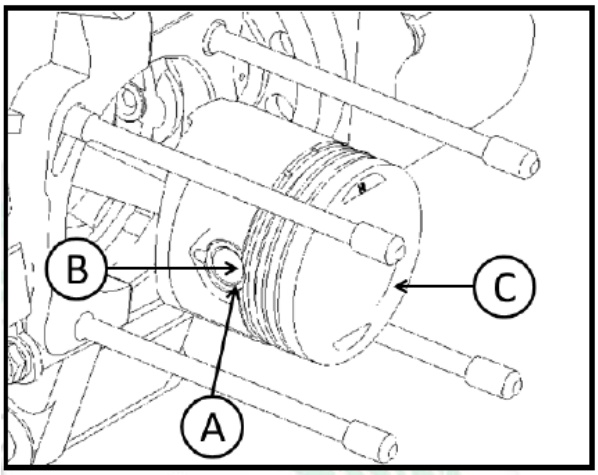
●Check the wear situation of inner wall of cylinder. Check whether there are obvious scratches and obviously shining irregularities

★If the wear is serious, please replace it.

Piston

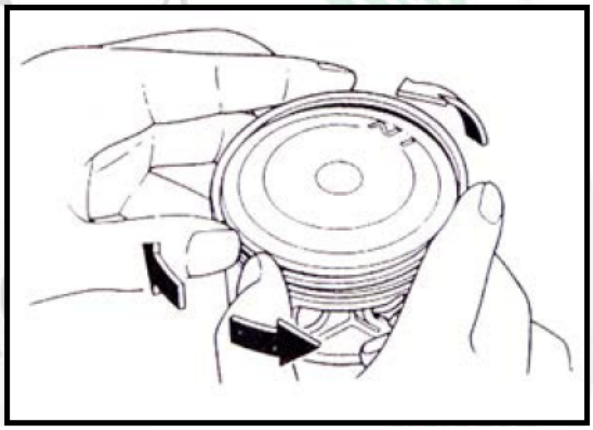
Disassembling Piston

●Remove the piston pin clip[A], remove the piston pin [B] and take the piston [C].



Note
During disassembly, do not drop the clip into the crankcase.

●Remove the piston ring.

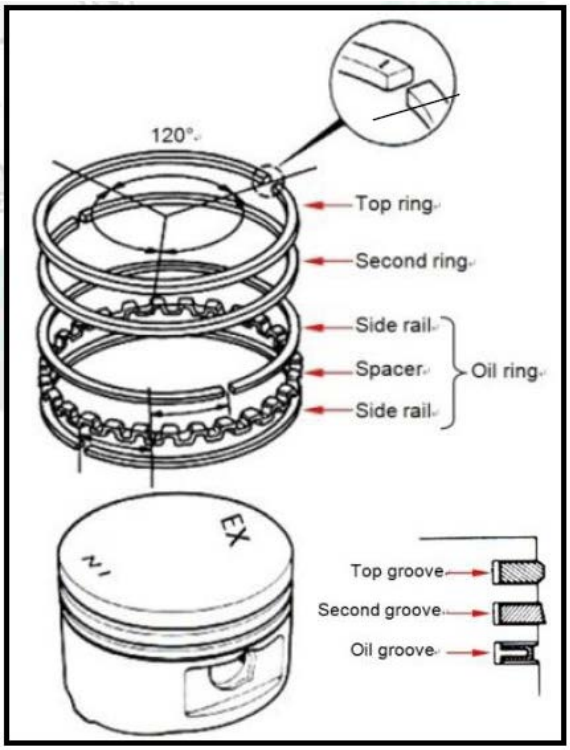


Installing Piston

●When replacing the piston, select the cylinder and piston of matching group for assembly and detect the cylinder matching clearance and other size requirements

●Apply engine oil to the piston ring and piston evenly, make the piston ring mark side up and install it in place. During assembly, make the opening directions of three piston rings differ by120 degrees and make two steel plates of combination oil ring stagger by 30°.

Note
Do not scratch the piston and do not break the piston ring. **After the piston ring is installed, it can rotate freely in the piston ring groove.**

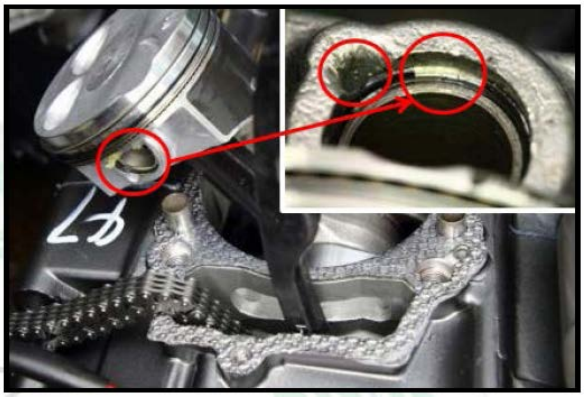


●Scale the gasket attached to the crankcase before installing the piston.

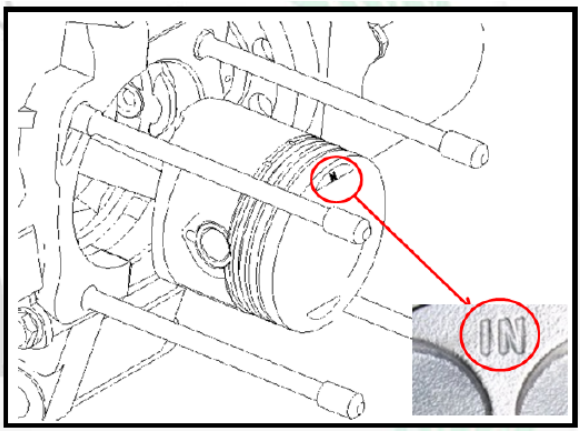
Note
Foreign materials shall not fall into the crankcase.

●Install the piston, piston pin and piston pin snap ring.

★When assembling with a new piston pin snap ring, the snap ring open end should not overlap the piston ring hole gap.



Note
Install the "IN" mark of piston crown into the intake valve **The piston pin snap ring shall completely fall into the piston snap ring groove and the phenomenon that the snap ring turnup does not fall into the groove shall not occur.**



Checking Piston, Piston Pin and Piston Ring

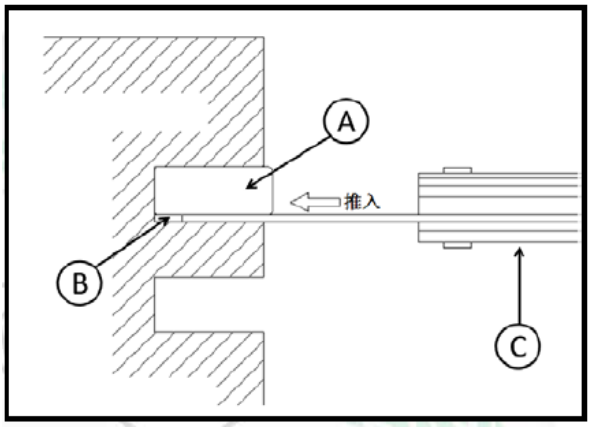
●Check the piston, piston pin and piston ring.

★Clear the carbon deposits inside the piston ring groove.

Note
Do not break or damage the piston ring.

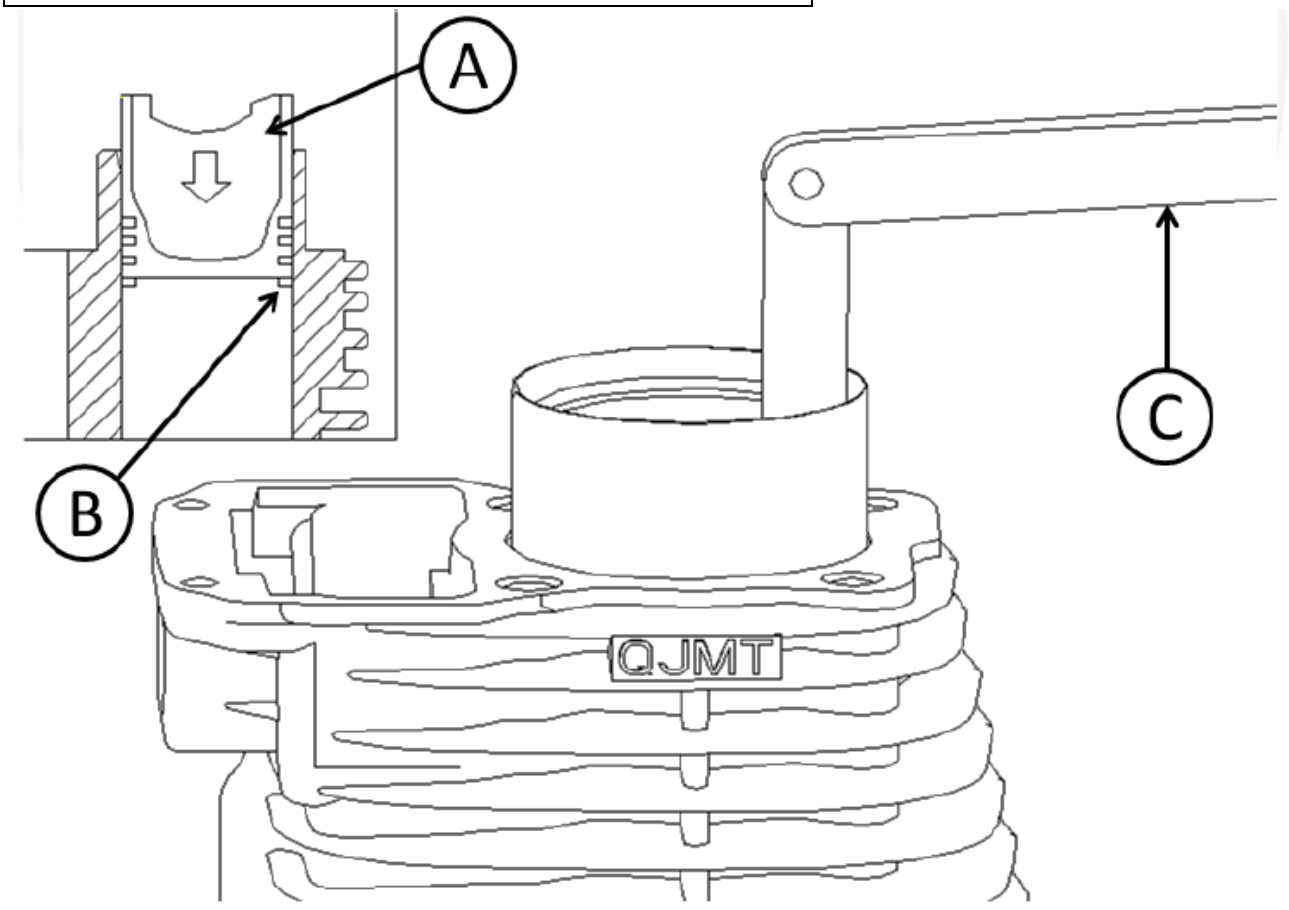
●Install the piston ring after the clearing. Press one side of piston ring with hands and measure the clearance between piston ring [A] and piston ring groove [B] with a thickness gauge [C].

Service limit: **top ring: 0.09mm.**
Second ring: 0.09mm.



●Remove the piston ring and install the piston rings at the bottom of cylinder.

Note
Press the piston ring [B] in the cylinder by using the piston head [A].



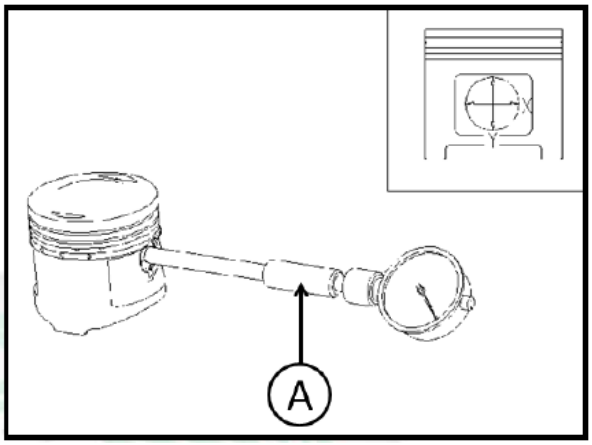
●Measure the piston ring joint clearance with a thickness gauge [C].

Service limit: 0.4mm.

●Measure the inner diameter of piston pin hole with a measurement meter

●Inner diameter of piston pin hole

Service limit: 16.02mm.



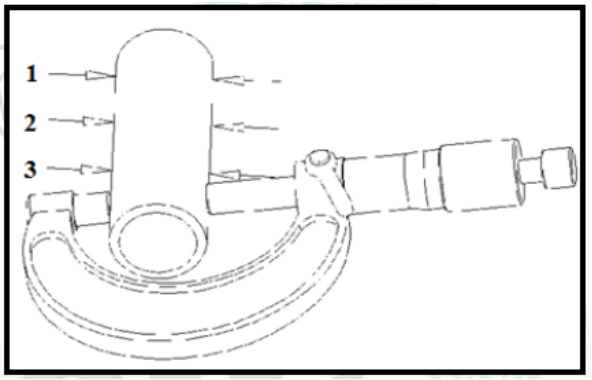
●Measure the outer diameter of piston pin.

Service limit: 15.99mm.

●Clearance between piston pin hole and piston pin.

Service limit: 0.025mm.

●Measure the outer diameter of piston.



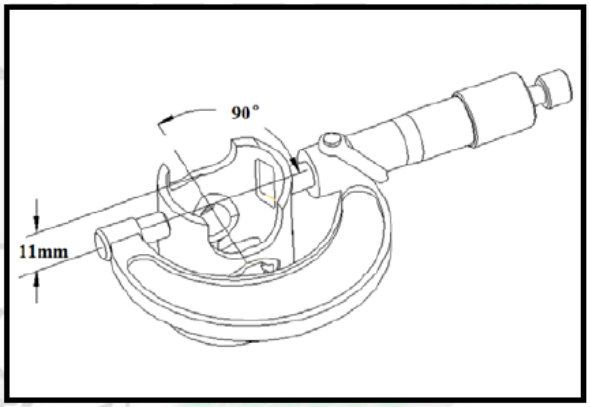
Note
The measurement position forms an angle of 90 degrees with the piston pin and it is 8-11mm below the piston skirt.

Service limit: 71.93mm.

●Check whether there are obvious scratches on the piston skirt and head.

★Determine that the piston is damaged if there are obvious deep scratch, collision and ablation at the top

●Measure the inner diameter of cylinder with a measurement meter [A].



Note
Measure the inner diameter of cylinder in the upper, middle and lower positions in the direction which forms a right angle with the piston pin.

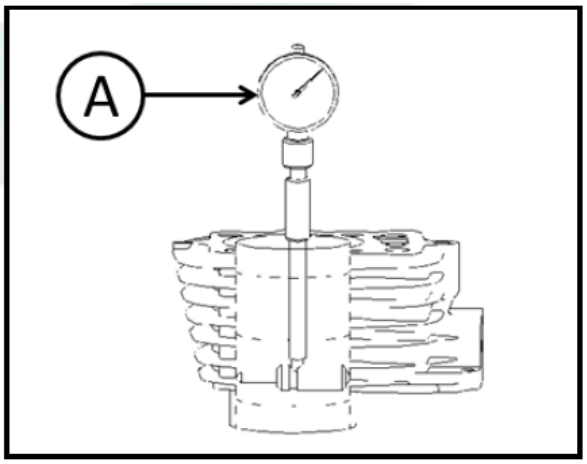
Service limit: 72.02mm.

●Check the scratch and wear on the inner wall of cylinder.

●Measure the cylinder matching clearance between cylinder and piston and be subject to the maximum.

●Selection and matching shall be carried out according to the grouping requirements.

Service limit: 0.07mm.

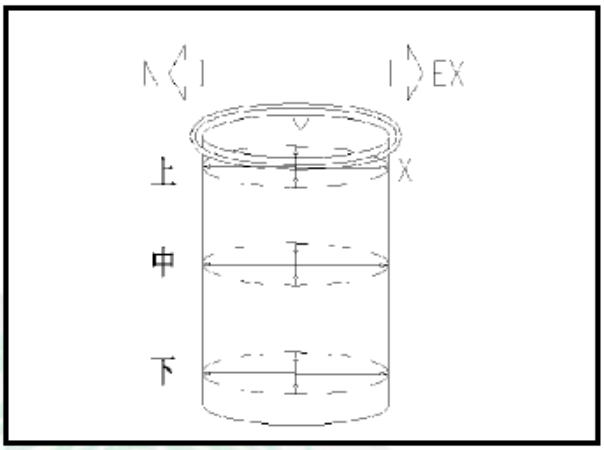


●Measure the roundness of inner wall of cylinder (inner diameter difference between X and Y directions).

Service limit: 0.015mm.

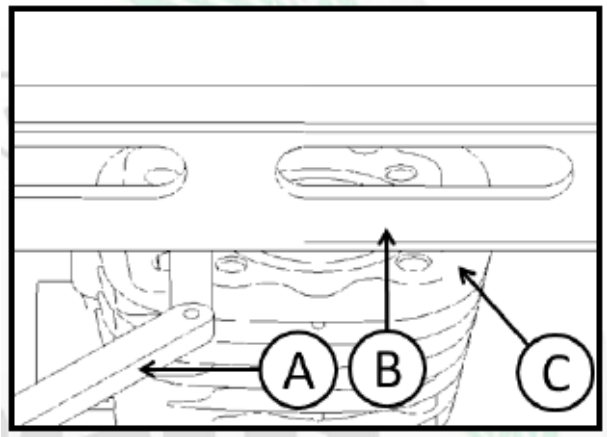
●Measure the cylindricity of inner wall of cylinder (inner diameter difference between X and Y directions in upper, middle and lower positions).

Service limit: 0.015mm.



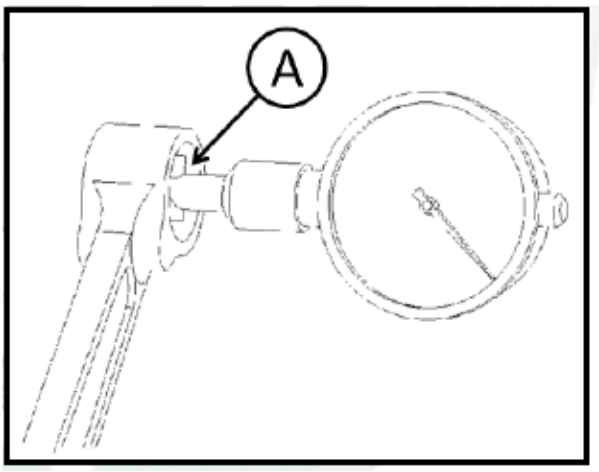
●Check the planeness [C] of cylinder surface with thickness gauge [A] and ruler [B].

Service limit: 0.08mm.



●Measure the inner diameter [A] of connecting rod small end.

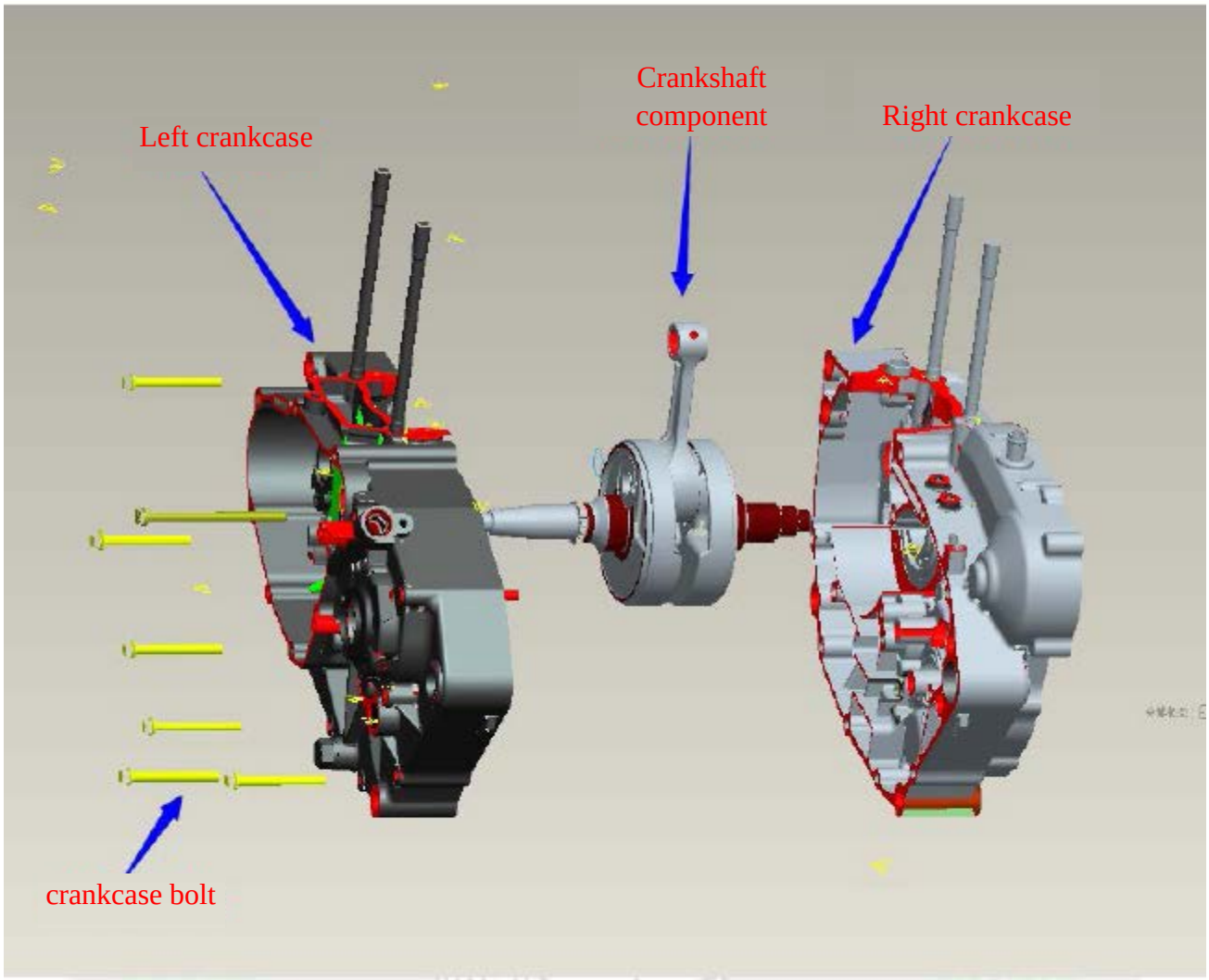
Service limit: 16.04mm.



●The parts shall be replaced if the above measurement exceeds the Service limit , and the new parts must be cleaned up; the inside of cylinder block cylinder sleeve, piston pin and piston pin hole and connecting rod small end hole must be applied with oil

Crankshaft Connecting Rod

Crankshaft Connecting RodExploded View



Preparation Information

Function of Crankshaft:

It can change the reciprocating motion of piston into rotary motion, generate torque and drive the valve mechanism and other auxiliary mechanisms simultaneously, and it is the installation carrier and power source of timing sprocket, drive gear, bearing, crank pin and other parts. From the appearance, we can see that the crankshaft is composed of crankshaft and connecting rod and this motorcycle adopts the assembled crankshaft which is mainly composed of crank, connecting rod, crank pin and needle bearing. Its crank pin is pressed into the crank wall with an interference fit. At the same time, the big ends of two rods pass through the crank pin. The crank is round and the thickness of the crank part facing to the crank wall is larger, which is used to balance the inertial force generated by the rotation of crankshaft. If the engine is overloaded for a long time or operated long, there will be wear and deformation. The maintenance methods of crankshaft connecting rod group are introduced below.

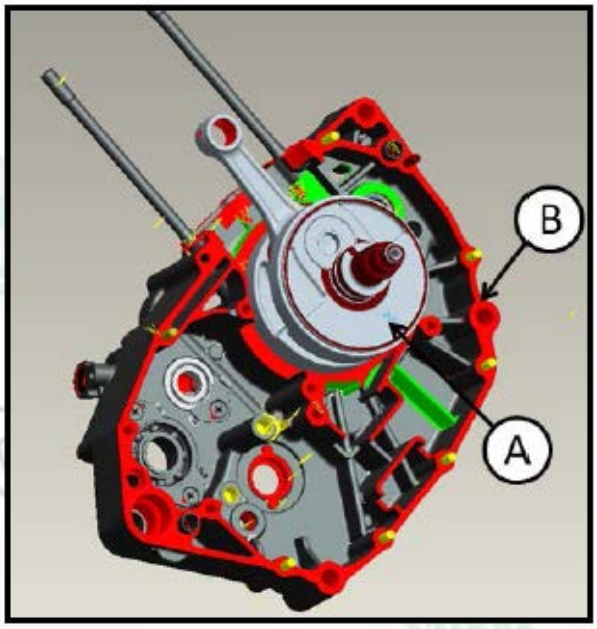
Technical Parameters

Item		Standard value	Service limit
Crankshaft connecting rod components	Horizontal clearance between connecting rod big ends	0.10-0.35mm	0.5mm
	Radial clearance between connecting rod big ends	0.012-0.024mm	0.035mm
	Run-out	0.03mm	0.1mm
	Crankshaft deflection	61.9-62mm	-0.2mm

Crankshaft Connecting Rod

Disassembling Crankshaft Connecting Rod

●Loosen the crankcase bolts, remove the right crankcase and other accessories on the crankshaft and crankcase, and remove the crankshaft connecting rod combination [A] from the left crankcase [B].



Note
Do not damage the joint surface. Do not remove the crankshaft by violent force, and use the same force to knock the crankshaft slowly.

Assembly

●Put the crankshaft in the crankcase and put primary shaft and secondary shaft and other parts at the specified position. Close the box finally.

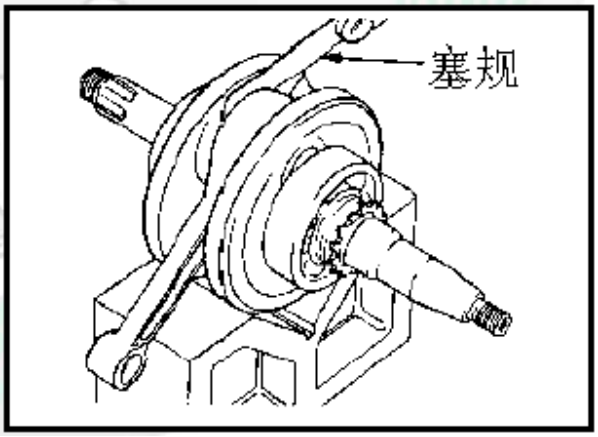
Note
The assembly of crankshaft shall be carried out in the order contrary to the disassembly order.

Checking

●Connecting rod clearance measurement:

★Put the crankshaft with bearing on the V-type iron, push the connecting rod big end to one side with hands, and measure the horizontal clearance of connecting rod big ends with a thickness gauge.

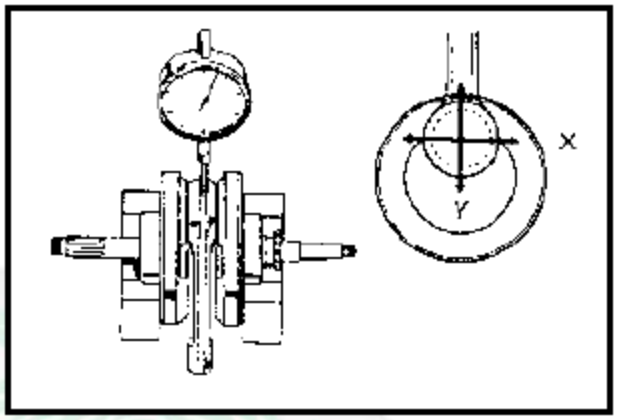
Service limit: 0.5mm.



●Measure the radial clearance of connecting rod big end:

★Fix a dial indicator on the connecting rod to measure the clearance between connecting rod big ends in X-Y direction. In addition, use the inner diameter dial gauge to check the inner diameter of connecting rod small end.

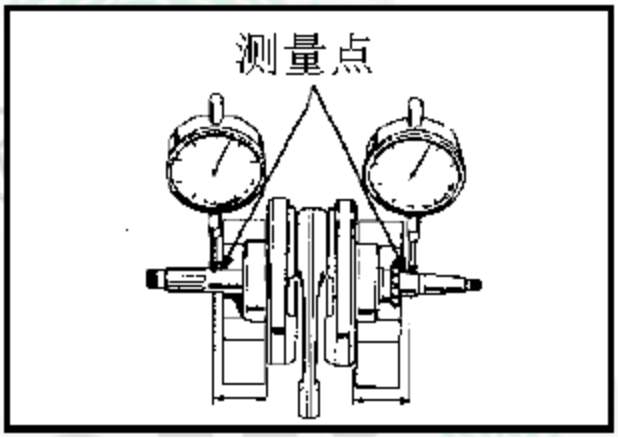
Service limit: 0.035mm.



●Crankshaft run-out measurement:

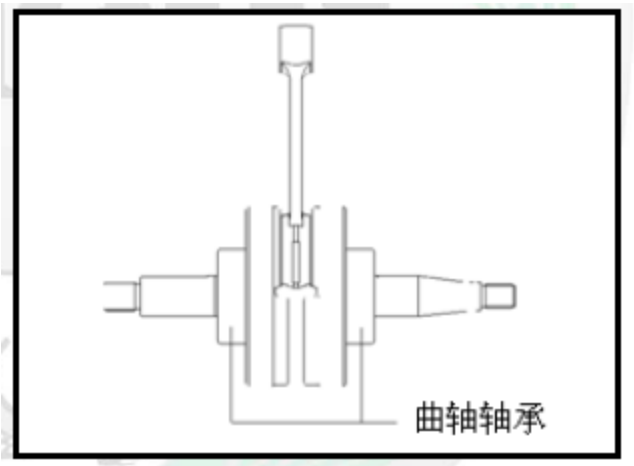
★Put the crankshaft with bearing on the V-type iron, fix 2 dial indicators on the left and right crankshaft journals and make the points of dial indicators be perpendicular to the main journal. Then turn the crankshaft to read the maximum and minimum readings of dial indicators. The difference of two readings is considered as the run-out value of crankshaft. If the value exceeds the specified value, it indicates that the crankshaft is bent and deformed and the bending direction shall be determined and corrected.

Service limit: 0.1mm.



●Check whether there is abnormal noise or slackness when the crankshaft bearing rotates. Check whether there are clamping stagnation and burn phenomena on the connecting rod big end. Check whether there is serious wear on the crankshaft journal and whether the crankshaft bearing is damaged.

If there are abnormal noises, slackness and other abnormalities, replace the crankshaft components.



Balance Shaft

Preparation Information

Function of Balance Shaft:

The balance shaft is used to balance the unbalanced force of engine, improve the stability of engine and improve the shock comfort of engine.

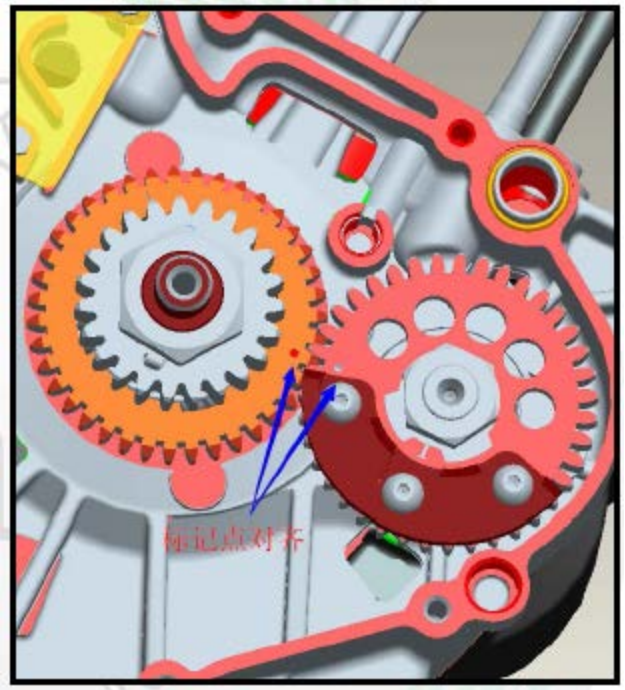
Disassembling Balance Shaft

●Loosen the mounting bolt, remove the right crankcase, remove the crankshaft from the left crankcase and take the balance shaft

Assembling Balance Shaft:

●The assembly of balance shaft shall be carried out in the order contrary to the disassembly order.

●Align the gear marks during assembly.



Checking Balance Shaft:

●Check whether there are wear and pitting phenomena on the balance shaft gear tooth surface.

●Check whether there are obvious wear and serious burn phenomena on the balance shaft journal.

●Check the run-out of balance shaft end. The method is the same as the crankshaft detection

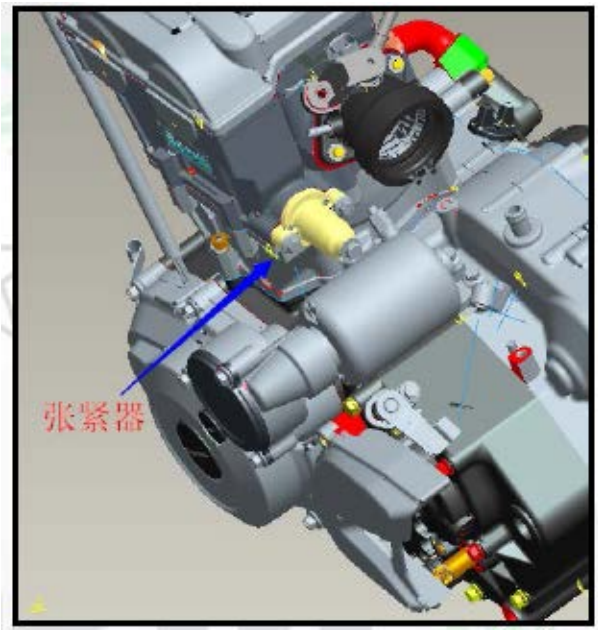
Tensioner

Function of Tensioner:

As a common holding device on the chain drive system, it can maintain the appropriate tension of chain in the driving process so as to prevent belt from skidding, or to protect the synchronous belt from being dragged out due to the occurrence of tooth jumping and disengaging, or to prevent the chain from loosening and falling off or to reduce the wear of sprocket and chain.

Disassembling Tensioner

●Remove the screw at the tail of tensioner, rotate and retract the tensioner with a tensioner assembling tool, stick the tool on the tail groove, disassemble the mounting bolt and remove the tensioner.



Assembling Tensioner

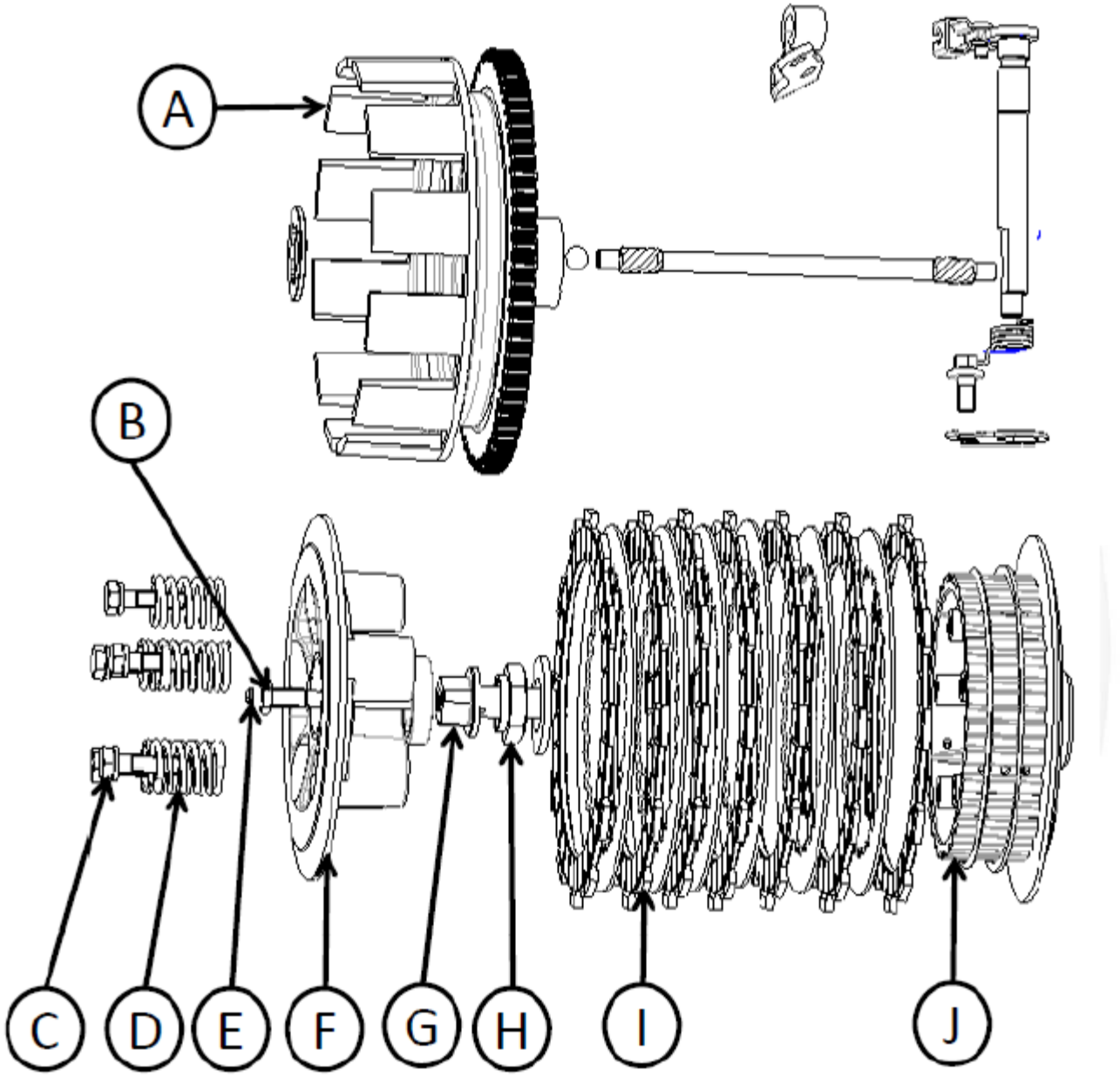
●Retract the tensioner with a special tool or slotted screwdriver before assembling. Fix the tensioner mounting bolt then release the tensioner slowly. Rotate the crankshaft of engine after adjusting the timing and assembling. Check the operating situation of chain. The chain shall not be too tight or too loose. The dislocation phenomenon shall not appear during timing.

Checking Tensioner

●Check whether obvious shaking of tensioner rack occurs and view whether clamping stagnation of rack exists by rotating and releasing the special tool or slotted screwdriver..

Clutch

Clutch Exploded View



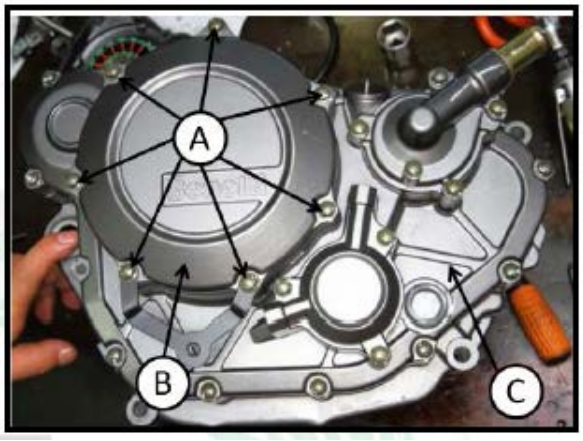
Clutch housing [A]
Slotted adjusting screw [B]
Bolt [C]
Clutch spring [D]
Nut [E]
Pressure plate [F]
Bearing block [G]
Locknut [H]
Friction plates
Clutch hub [J]

Special Tool

Clutch locking tool:	

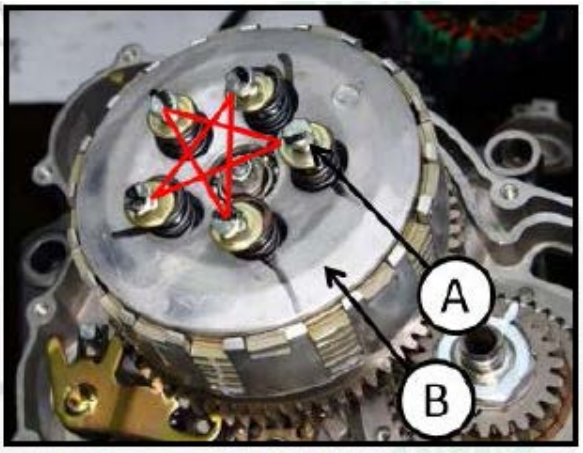
Disassembling Clutch

●Disassemble the bolt [A] and open the clutch cover [B] on the right crankcase

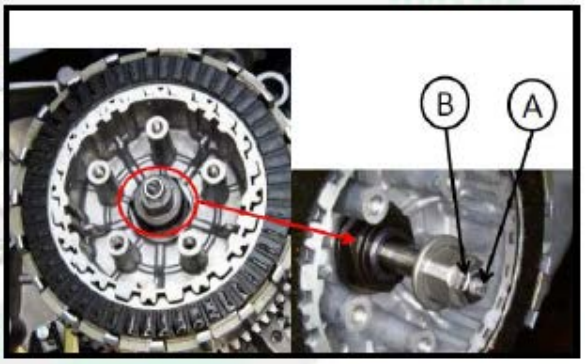


●Loosen the five bolts [A] of pressure plate [B] in the diagonal crossover way.

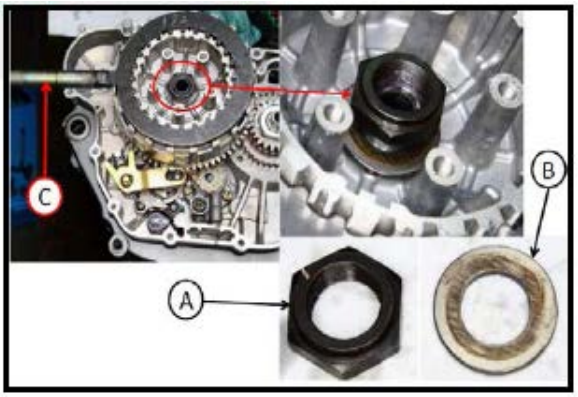
●Remove the pressure plate, clutch spring and bearing block.



●Remove the slotted adjusting screw [A] and nut [B].

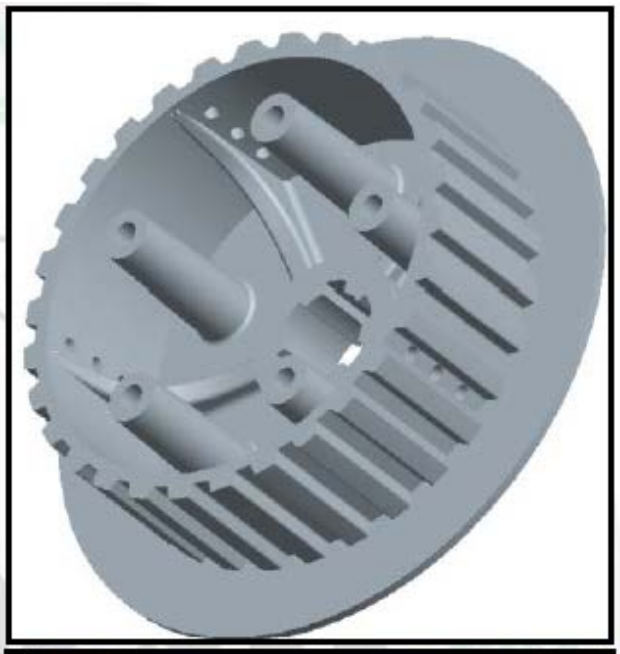


●For the special tool [C] locking clutch, remove the locknut and washer[B].

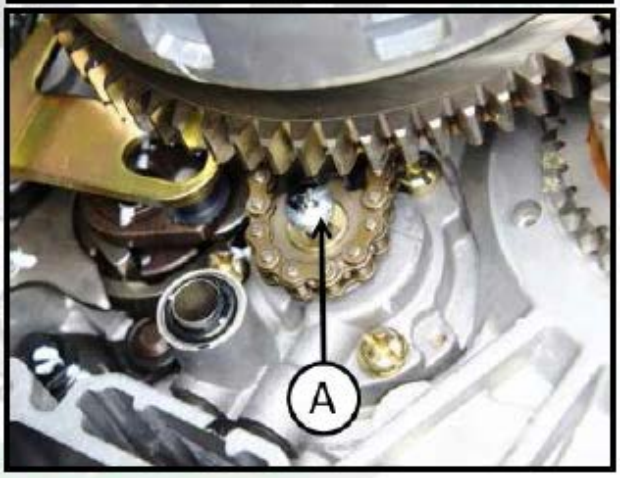


●Remove the clutch disc and friction plates.

●Remove the clutch hub.
●Remove the spline gasket.



●Remove the oil pump lock screw [A].



●Remove the oil pump sprocket, clutch shell component and chain.

Installing Clutch

●The assembly shall be carried out in the order contrary to the disassembly order.

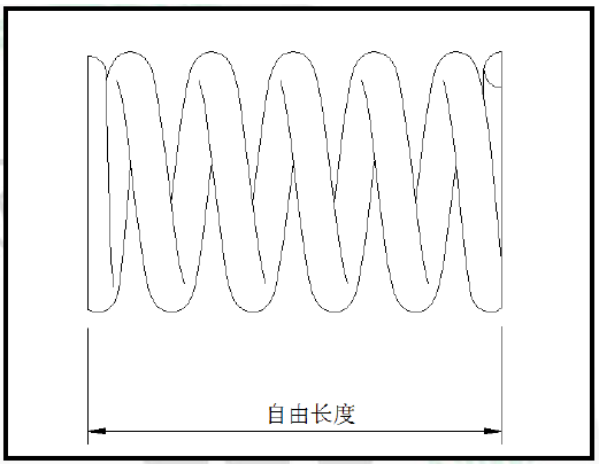
Checking Clutch

●Check whether there are burrs or damaged marks on the clutch shell groove; repair it with a file if any, and replace it if the number of parts to be repaired is too large.

●Check whether the pressure plate and tooth shape of clutch hub are damaged, and replace them if damaged.

●Measure the free length of pressure spring.

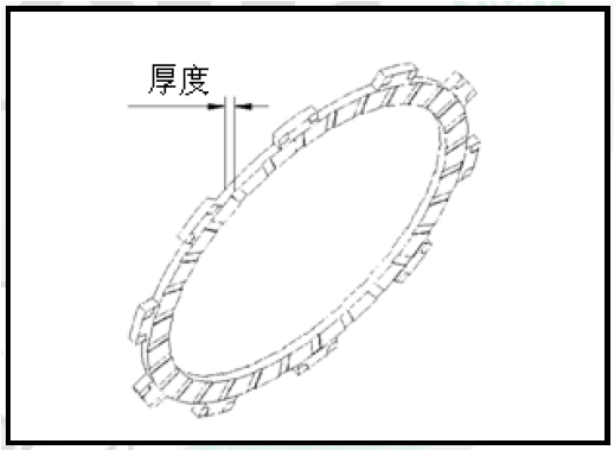
Service limit I: replace below 41mm.



●Measure the thickness of friction plate with vernier calipers.

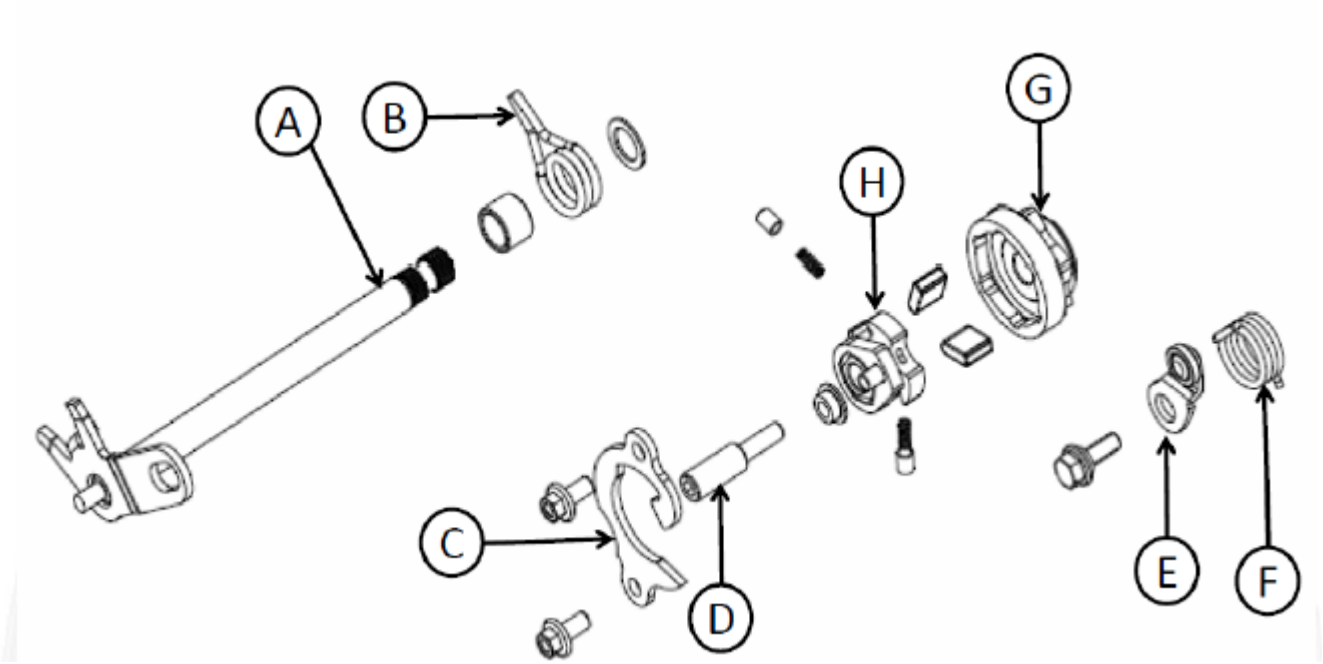
Service limit I: replace below 2.6mm.

Service limit II: replace below 2.8mm.



Shift Mechanism

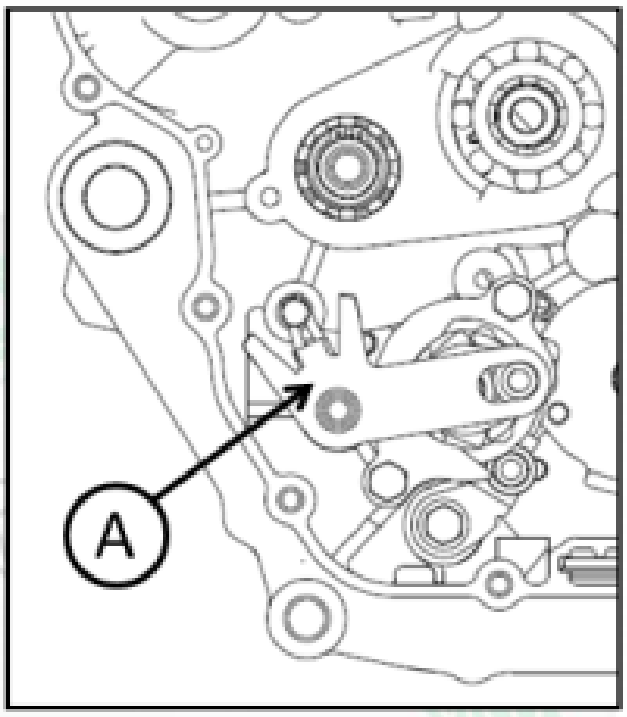
Shift Mechanism Exploded View



Shift lever [A]
Return spring [B]
Star wheel pressure plate [C]
Shift positioning roller arm shaft [D]
Shift locating roller arm component [E]
Return spring [F]
Star locating plate [G]
Separating seat [H]

Disassembling Shift Mechanism

●Remove the shift lever [A] and return spring



●Remove the bolt and star wheel pressure plate
●Remove the shift locating roller arm shaft, shift locating roller arm shaft component and return spring
●Remove the star locating plate fixing pin, separating seat and star locating plate
●The disassembled parts are shown in the **Exploded View**

Installing Shift Mechanism

●The assembly shall be carried out in the order contrary to the disassembly order.

Checking Shift Mechanism

●Before the decomposition, the shift lever shall be able to rotate flexibly without clamping stagnation;
●Check the wear of shift lever component and replace the component if the wear is serious;
●Check whether the shift lever is bent and replace it if it is bent overly;
●Check whether the elastic force of return spring is reduced and replace it if necessary;
●Check the wear ofshifting cam lock plate and separating seat and replace it if they are worn seriously.

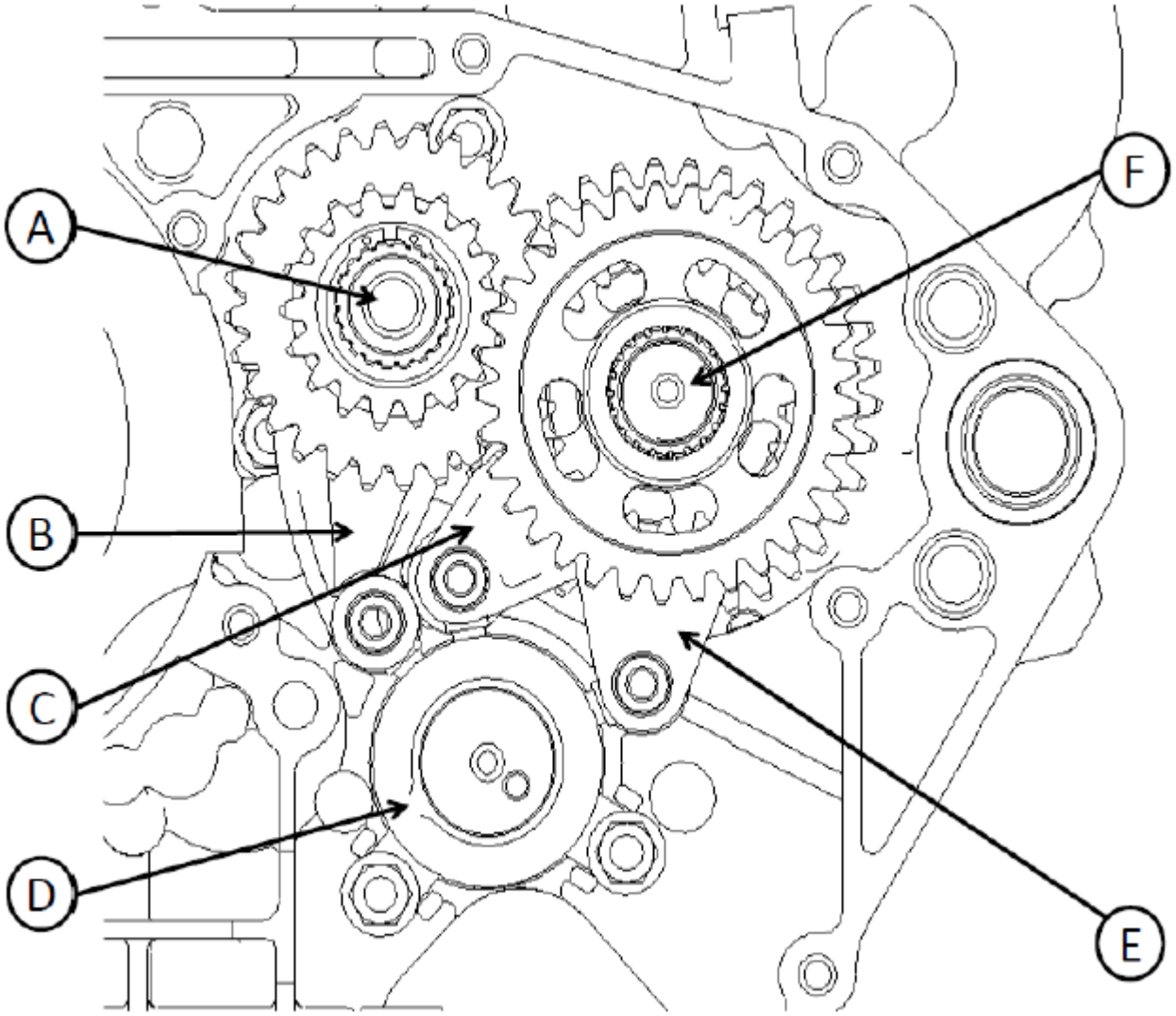
Disassembling primary/secondary Shaft Component

●Loosen the closing bolt

●Separate the crankcase

Note
Do not damage the spacer and closing surface

●Remove the left crankcase



Main shaft [A]

Main shaft fork [B]

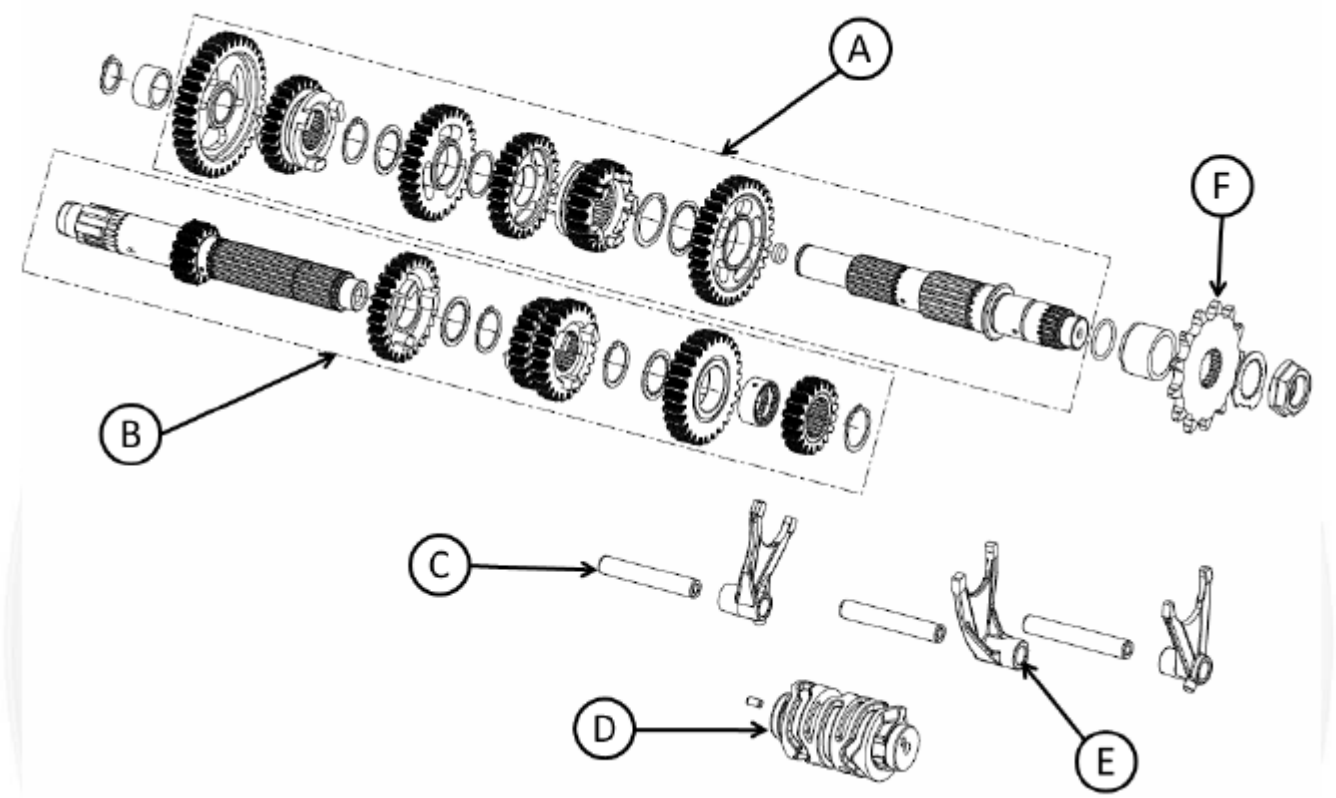
SecondarySecondary shaft five-gear fork [C]

Shift drum [D]

SecondarySecondary shaft six-gear fork [E]

SecondarySecondary shaft [F]

●Pull out the fork shaft
●Remove the fork
●Pull out the shift drum, main shaft component and secondarysecondary shaft
●The disassembled parts are shown in the**Exploded View**



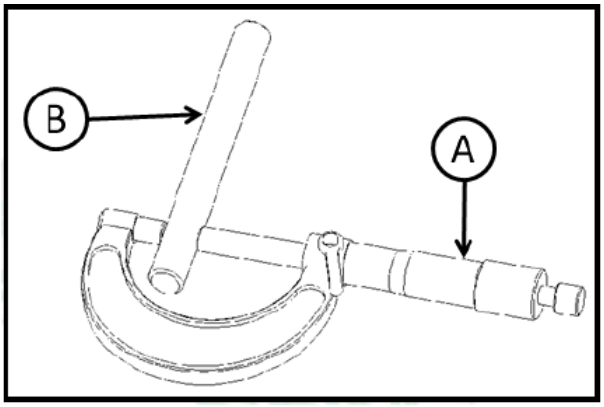
Primary shaft [A]
Secondary shaft [B]
Fork drum [C]
Shift drum [D]
Fork [E]
Output sprocket [F]

Installing primary/secondary Shaft

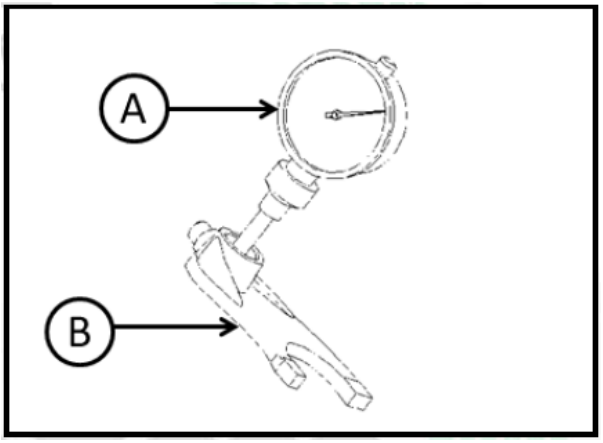
●The assembly shall be carried out in the order contrary to the disassembly order.

Checking primary/secondary Shaft Component

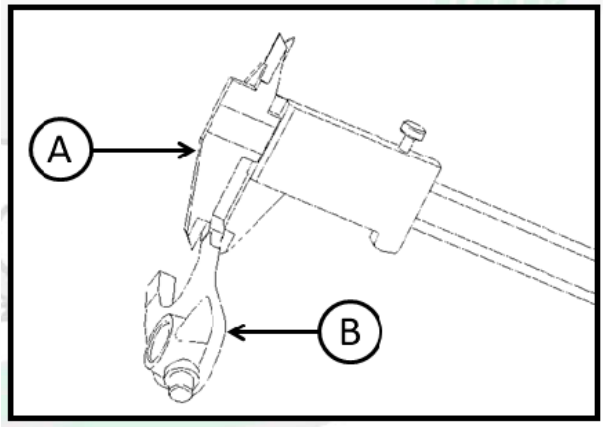
●Measure the outer diameter of fork shaft [B] with a micrometer [A]
Service limit: 9.97mm



●Measure the inner diameter of fork hole [B] with a measurement meter [A]
Service limit: 10.03mm

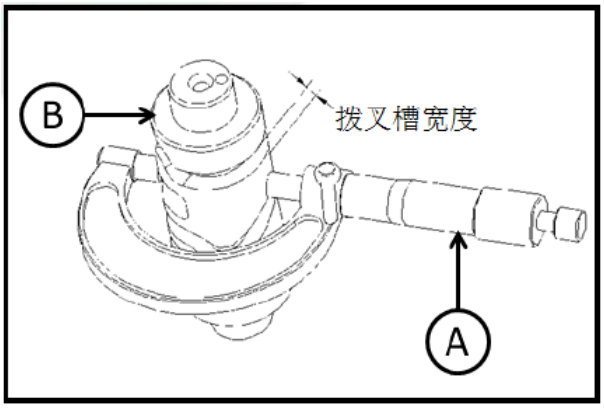


●Measure the thickness of fork [B] with calipers [A]
Service limit: 4.7mm



●Measure the diameter of shift drum [B] with a micrometer [A]
Service limit: 41.5mm

●Measure the width of fork groove with calipers
Service limit: 6.5mm



CHAPTER VI CHASSIS

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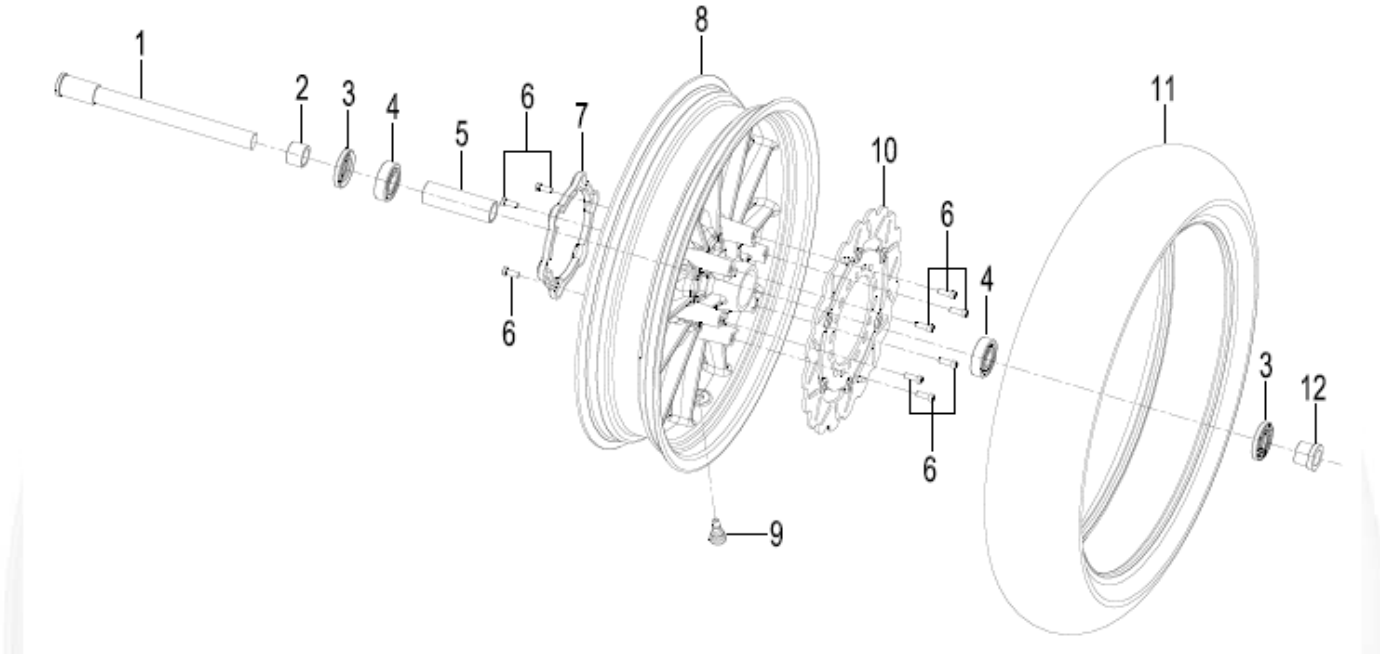
Wheel / Tire

Exploded View of Front Wheel / Tire



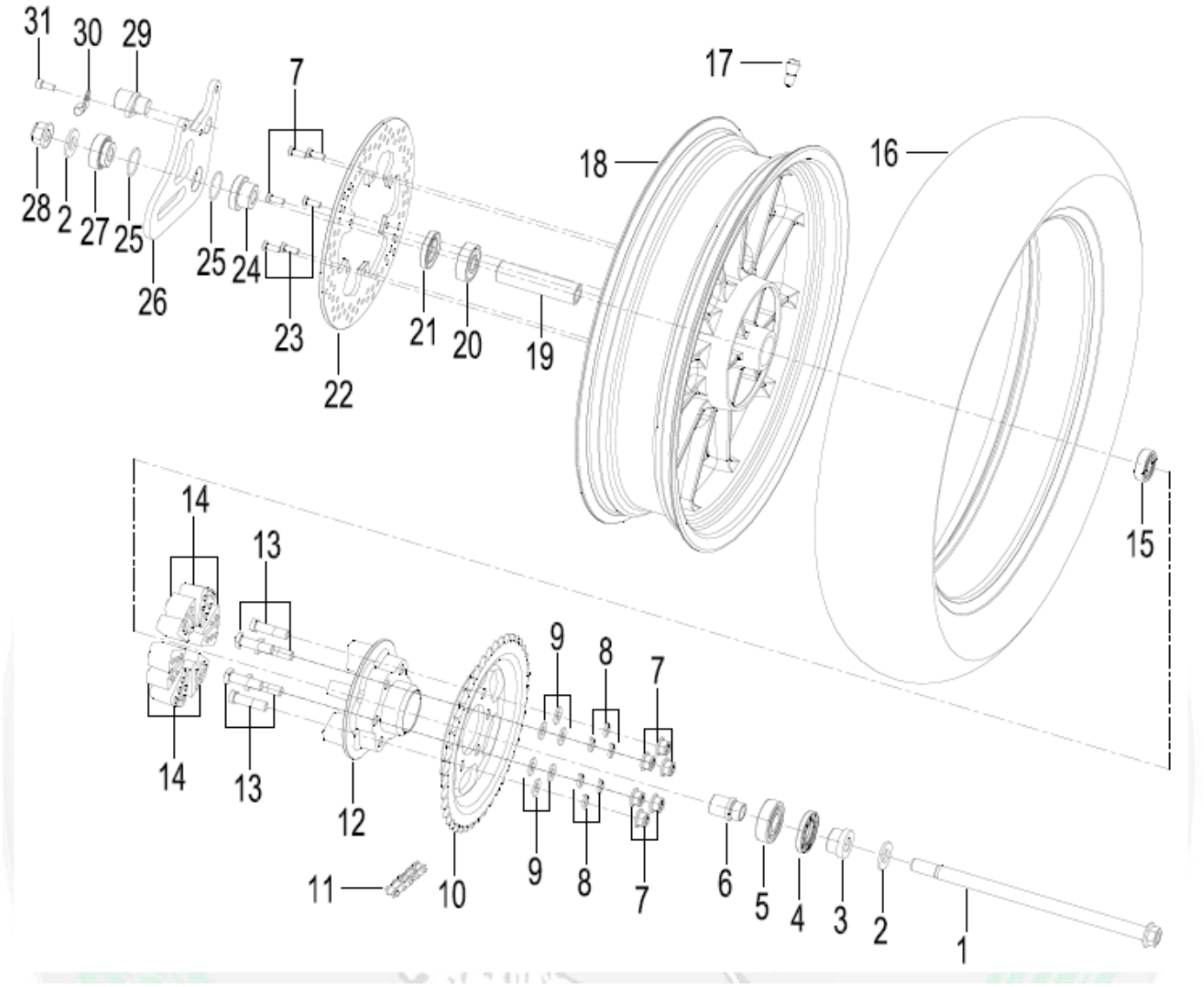
No.	Parts and specifications	Torque		Remark
		N·m	kgf·m	
1	Front Wheel Axle	107	10.7	Si
2	Right sleeve of front wheel			Si
3	Dust ring components			Si R
4	Radial Ball Bearing 6204-2RS			Si
5	Intermediate sleeve of front wheel			Si
6	Bolt M8×16	22	2.2	L
7	Trim cover of front rim			
8	Front rim			
9	Valve Z2-01-1/straight			R
10	Front brake disc/O280			
11	Tubeless Tire 110/70-17			
12	Left sleeve of front wheel			Si

L: apply Loctite.

R: replace parts.

Si: apply silicone grease.

Exploded View of Rear Wheel / Tire



No.	Parts and specifications	Torque		Remark
		N·m	kgf·m	
1	Rear Wheel Axle M14×1.5×292	150	15.0	
2	Gasket 16			
3	Left sleeve of rear wheel			Si
4	Dust ring components			Si R
5	Radial Ball Bearing 6204-2RS			Si
6	Chain drive sleeve			
7	Self-locking nut M10×1.25	45	4.5	L
8	Spring washer φ10			
9	Gasket			
10	sprocket /43 teeth			
11	Chain 520HO-1×108			
12	Sprocket hub			
13	Sprocket installing bolt			
14	Rear wheel buffer block			
15	Radial Ball Bearing 6202-2RS			Si
16	Tubeless Tire 140/60-17			
17	Valve			
18	Rear rim			
19	Bearing sleeve			Si
20	Radial Ball Bearing 6302-2RS			
21	Right oil seal components of front wheel			Si R
22	Rear brake disc/φ240			
23	Hydraulic brake disc installing bolt M6×16	10	1.0	L
24	Right sleeve of rear wheel			Si
25	O-ring seal 30×1.8			R
26	Rear Brake Bracket components			
27	Sleeve			
28	Self - locking nut M14×1.5	150	15.0	
29	Speed sensor			
30	Clutch clip			
31	Socket head cap screw M6×12	10	1.0	

L: apply Loctite.

R: replace parts.

Si: apply silicone grease.

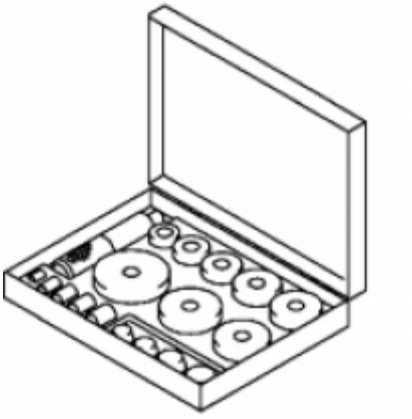
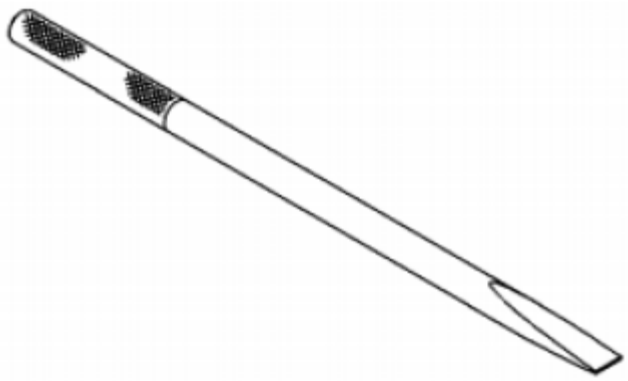
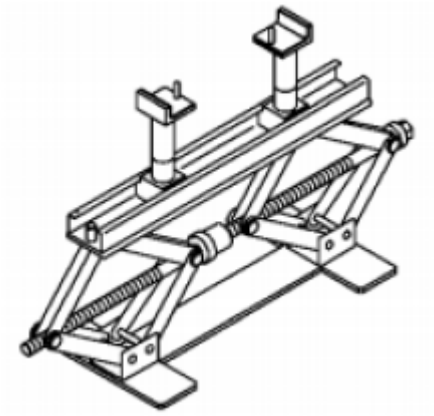
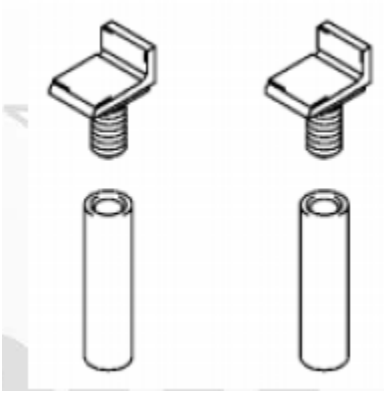
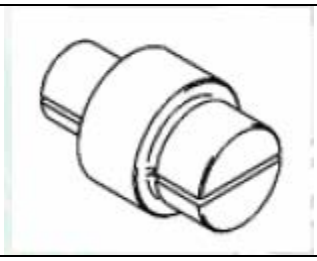
Technical Parameters

Item	Standard	Service Limit
Wheel (rim)		
Wheel runout:		
Axial	≤TIR 0.5 mm	TIR 1.0 mm
Radial	≤TIR 0.8 mm	TIR 1.0 mm
Wheel shaft runout /100 mm	≤TIR 0.03 mm	TIR 0.2 mm
Wheel balancing	≤10 g	—
Balance weight	10 g, 20 g, 30 g	—
Rim dimensions:		
Front wheel	17×MT3.50	
Rear wheel	17×MT4.50	—
Tire		
Tire pressure (when the tire is being cooled):		
Front wheel	220±10kPa	—
Rear wheel	250±10kPa	
Tread depth:		
Front wheel	5 mm	1 mm
Rear wheel	5 mm	1 mm
Standard tire:	Manufacturer, model	Specifications
Front wheel	CORDIAL/CY15 6A/CCC/E4 75R-0005102	110/70-17
Rear wheel	CORDIAL/CY185A/CCC/E4 75R-0006820	140/60-17
(Q60-00)/ (Q19-10) Front wheel	METZELER /M/C/CCC/E3 75R-0056965/DOT	110/70R17 54H/ radial tire
(Q60-00)/ (Q19-10) Rear wheel	METZELER /M/C/CCC/E3 75R-0056678/DOT	150/60R17 66H/ radial tire

Warning

Front and rear wheels must be the products of the same manufacturer!

Special Tools

Complete set of tools for installing bearing	Bearing remover shaft
	
Jack:	Jack accessories:
	
Bearing remover head	
	

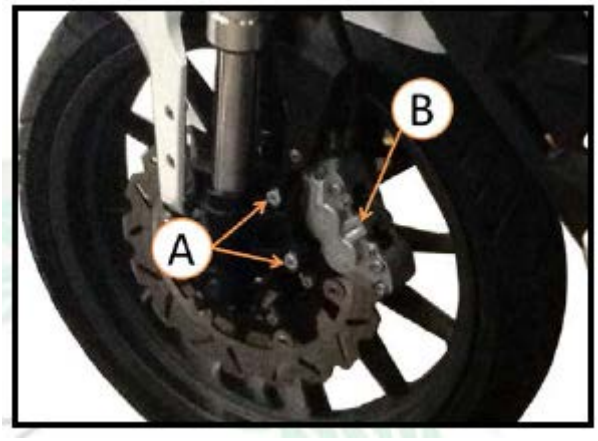
Wheel (Rim)

Disassembling Front Wheel

•Disassemble:

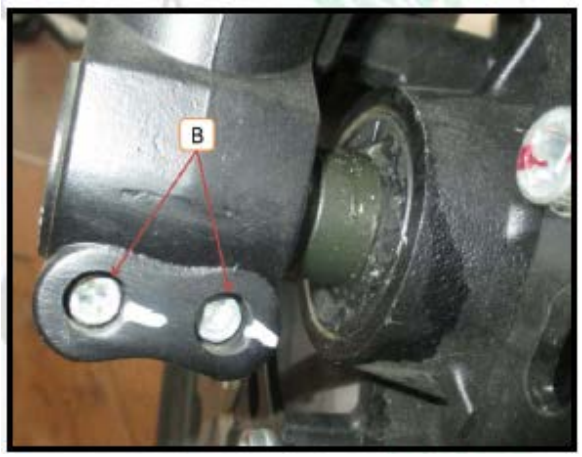
Front calipers mounting bolt [A]

Front calipers

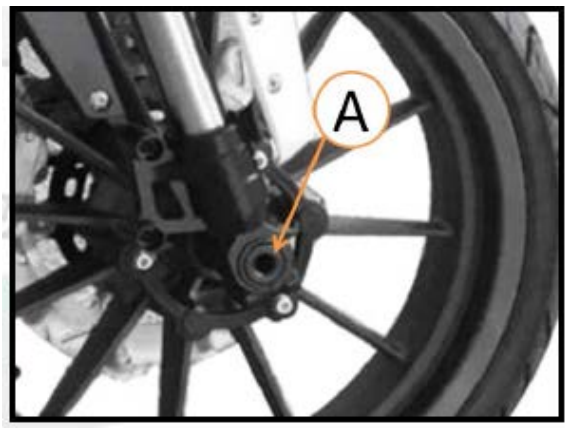


•Loosen:

Shaft tightening bolt [B] (right side),



Front shaft [A],



• Disassemble the fairing at the lower part (see “frame”—“disassembling fairing”).

• Lift the front wheel from the ground using a jack.

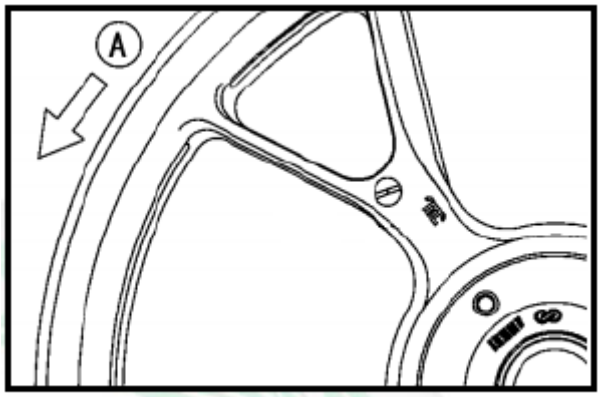
Special tools—jack and jack accessories:

• Disassemble shaft, pull out shaft to the right, and separate front wheel from front fork.

Notes
Please do not place the motorcycle in the side direction or press wheel against brake disc, otherwise, brake disc may be damaged or deformed. Please place wood blocks below wheel, to prevent brake disc from contacting the ground.

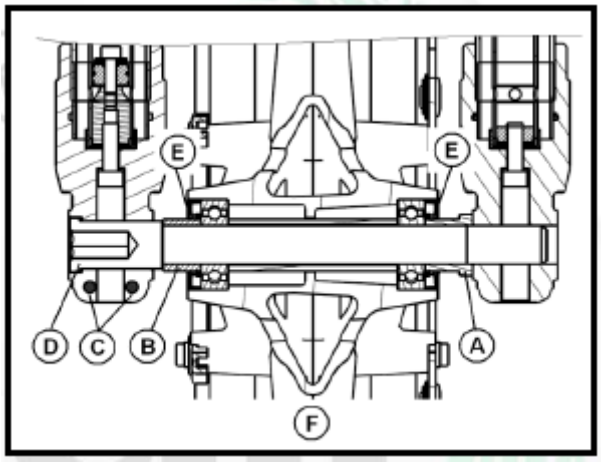
Installing Front Wheel

Remarks
○Rotating direction of wheel [A].



• Check the rotation of front wheel, and then install front wheel.

•Apply high-temperature lubricating grease to the edge of the oil seal [E].
•Put the left shaft sleeve of front wheel [A] over the left side of the hub.
•Put the right shaft sleeve of front wheel [B] over the right side of the hub.
•Insert the wheel shaft [D] from the right.
•Tighten the wheel shaft [D]
Tightening screw of right shaft [C]
View from the head of motorcycle to the rear [F]
Locking torque of Front Wheel Axle nut: 107 N·m



•Before locking the wheel shaft tightening screw at the bottom of front fork at the front right side, rock the front fork up and down for 4-5 times, to make the bottom of front fork and Front Wheel Axle fit perfectly with each other.

Remarks
○Place one stop block in front of front wheel, to prevent motorcycle from shifting.

•First lock the wheel shaft tightening screw at the bottom of front right fork.
Locking torque of Front Wheel Axle tightening screw: 8 N·m

Remarks
○Lock two tightening screws twice alternatively, to ensure even locking torque.

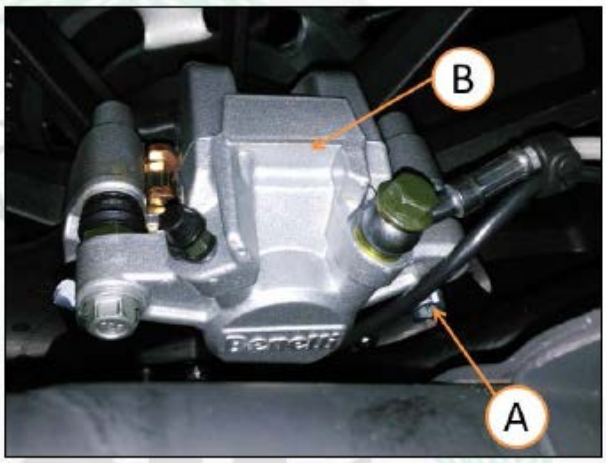
• Install the parts disassembled previously (see the corresponding chapters).
• Check whether the front brake is normal (see “Regular Maintenance”—“Checking Whether the Brake is Normal”)

⚠Warning
○**Grasp the brake handle/pedal, until Brake Pads is against the brake disc, so that the brake handle/pedal can function as normal. Do not ride the motorcycle before you complete the above steps! Because if you do not complete the above operation, brake may not work normally when being used for the first time and thus danger is caused.**

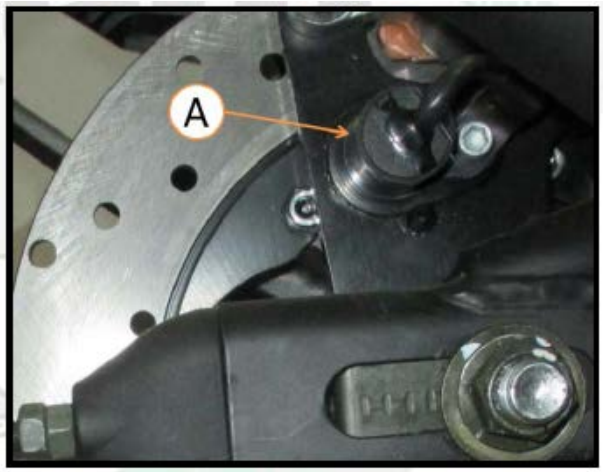
Disassembling Rear Wheel

•Lift rear wheel from the ground using bracket [A].

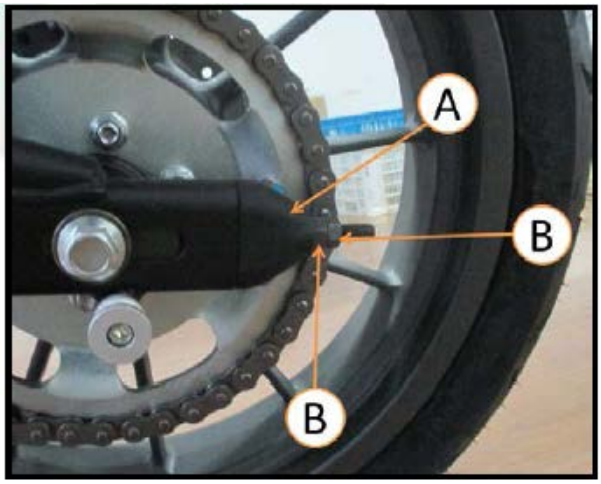
•Disassemble:
Rear calipers mounting bolt [A],
rear calipers [B]



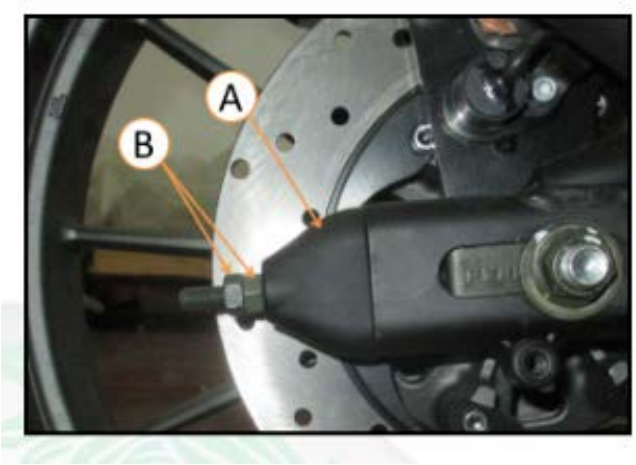
•Disassemble rear wheel speed sensor [A] from the calipers



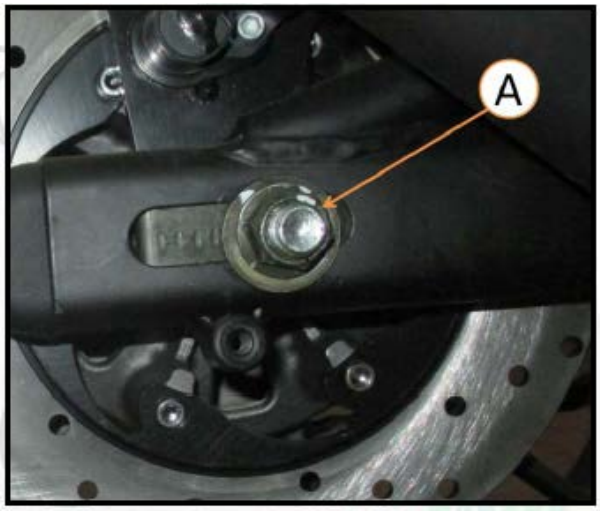
•Loosen:
Left chain adjuster [A],
Chain adjuster locking nut [B],



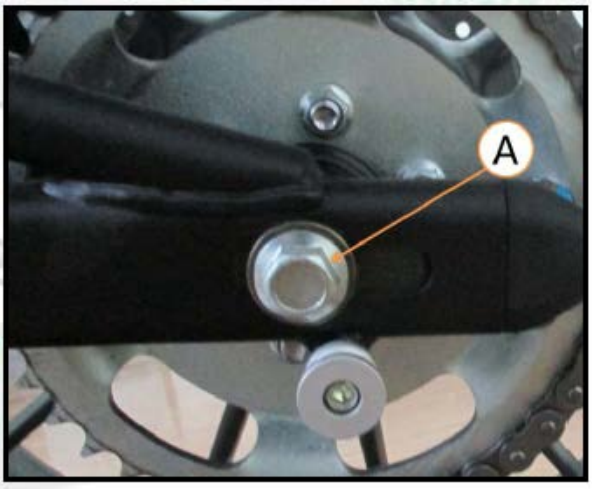
•Loosen:
Right chain adjuster [A],
Chain adjuster locking nut [B],



•Disassemble:
Rear Wheel Axle nut [A],

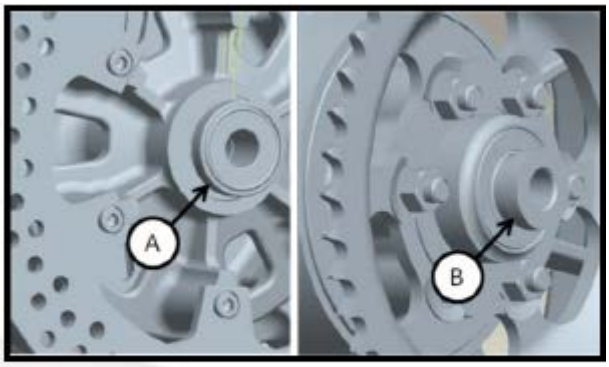


•Disassemble:
Rear Wheel Axle [A],
•Remove the drive chain of rear sprocket to the left
•Rotate rear wheel backwards to remove it.



Note
Do not place the wheel on the ground horizontally and make the brake disc towards, otherwise, brake disc may be damaged or deformed. Please place wood blocks below wheel, to prevent brake disc from contacting the ground.

Installing Rear Wheel

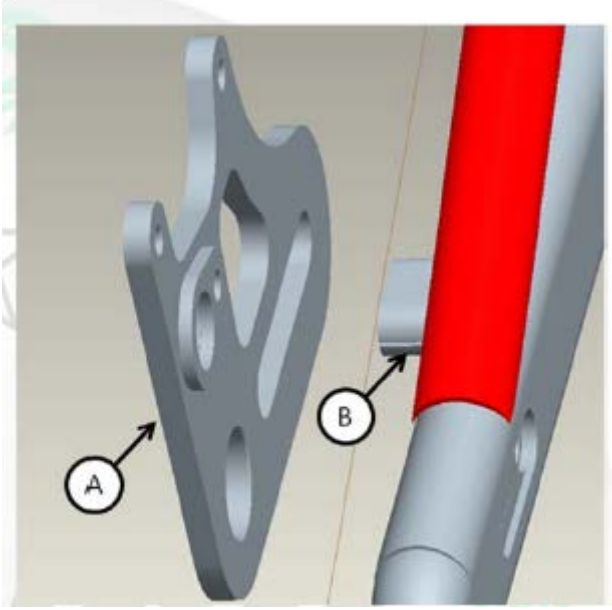


•Apply high temperature grease to the edge of oil seal.

•Put shaft sleeve at two sides of hub.

Shaft sleeve at right side [A]

Shaft sleeve at left side [B]



•Install drive chain at the rear sprocket.

•Install calipers bracket [A] to the swing arm stop block [B].

•Insert the rear shaft from the left side of wheel, and then tighten rear shaft nut.

Locking torque of Rear Wheel Axle nut: 150N·m

•Adjust the slackness of drive chain after installing the rear wheel (see “Regular Maintenance”—“Check the Slackness of Drive Chain”).

• Install the rear calipers (see “Brake” —“Installing Calipers”).

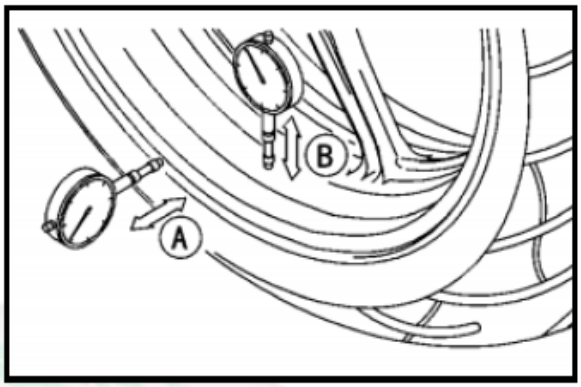
• Mount the rear wheel speed sensor.

• Check whether the rear brake is normal (see “Regular Maintenance”—“Check Whether the Brake is Normal”).

⚠Warning

Tread on brake pedal, until the Brake Pads is against the brake disc, so that the brake pedal can function as normal. Do not ride the motorcycle before you complete the above steps! Because if you do not complete the above operation, brake may not work normally when being used for the first time and thus danger is caused.

Checking Wheels



•Lift the front wheel / rear wheel from the ground.

Special tools: jack and jack accessories

•Gently rotate the wheel to check whether the wheels are able to rotate smoothly.

★If the wheels do not rotate smoothly, replace the hub bearings (see "Removing / Installing Wheel Bearings").

•Inspect the wheels for small cracks, dents, bends or deformations.

★ If the wheel is broken, replace it!

•Remove the wheels and support the wheels and tires using wheel shaft.

•Use the micrometer to measure the axial runout [A] and the radial runout [B] of the rim.

★If the runout of rim exceeds the limit, check the hub bearing (see "Checking Hub Bearing") .

Rim runout (in the case of installing tires)

Standards:

Axial runout ≤TIR 0.5 mm

Radial runout ≤TIR 0.8 mm

Service Limit:

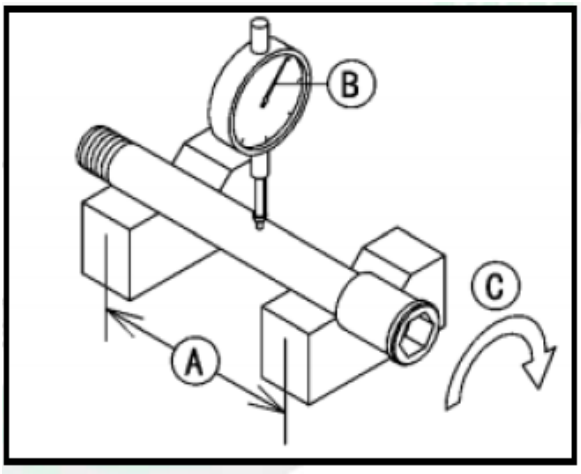
Axial runout TIR 1.0 mm

Radial runout TIR 1.0 mm

⚠Warning

Do not repair the damaged wheels! The damaged wheel (except that wheel bearing is damaged) must be replaced, to ensure the safe riding of motorcycle.

Checking Wheel Shaft



•Disassemble the front and Rear Wheel Axles (see "Disassembling Front Wheel / Rear Wheel").

• Visually inspect the front and Rear Wheel Axles for damage.

★If the wheel shaft is damaged or bent, please replace it!

•Place the wheel shaft on two V-shaped blocks with a spacing of 100 mm [A] between them. In the middle of the two V-shaped blocks, put a dial indicator [B]. Turn the [C] wheel shaft to measure the runout. The difference between the maximum and minimum readings of the dial indicator is the runout of the wheel shaft.

★If the wheel shaft runout exceeds the Service Limit, please replace the wheel shaft!

Shaft runout / 100 mm

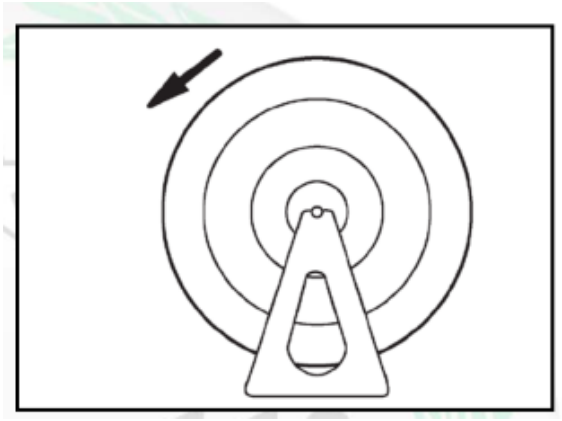
Standard: ≤TIR 0.03 mm

Service Limit: TIR 0.2 mm

Adjustment of Static Balance of Rim

Note
After replacing outer tire or rim or both of them, adjust the static balance of rim. **When adjusting the static balance of rim, brake disc should be installed in place.**

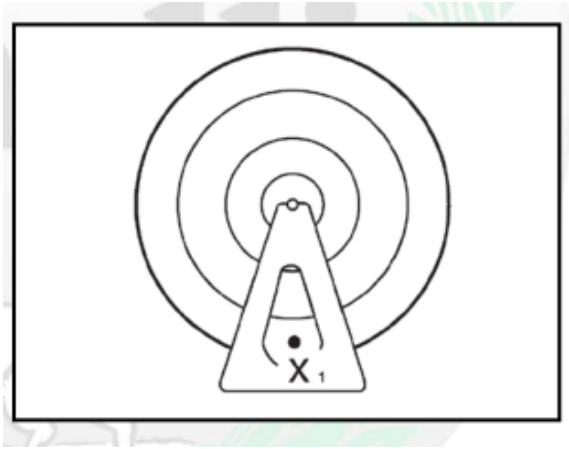
•Disassemble front and rear wheels (see “Disassembling Front / Rear Wheel”).
•Disassemble balance weight
•Look for the gravity point of rim



Note
Place front wheel at suitable balancing frame

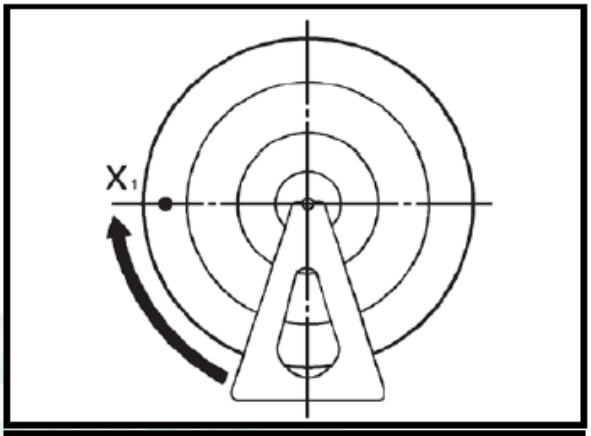
a. Rotate rim:

b. When rim stops rotating, make “X_1” mark at the bottom of front wheel;

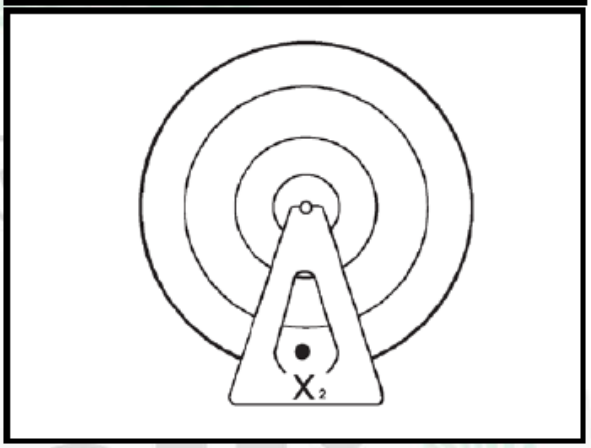


c. Rotate the front wheel by 90°, and make a "X_1" mark at the place shown in the figure below:

d. Release rim:



e. When rim stops rotating, make a "X_2" mark at the bottom of front wheel;

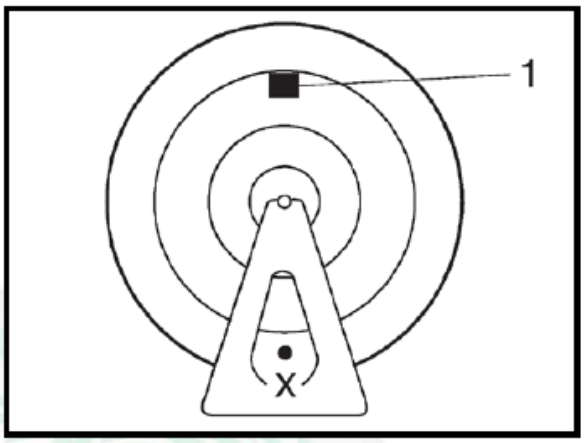


f. Repeat Steps [c] to [e] for several times, until all marks stop at the same point;

g. The place where all marks stop is the gravity point "X" of the rim;

•Adjust static balance

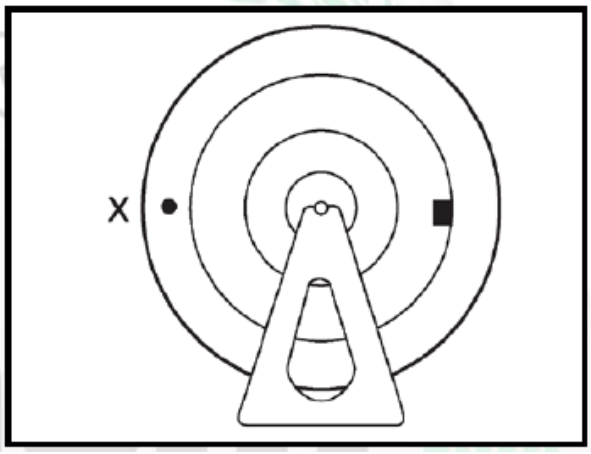
a. Put balance weight “1” at the place opposite to the hard point “X” at the rim.



Note
Start from the lightest weight.

Remark
○*Benelli dealers sell the balance weights of 10, 20 and 30 g respectively. The imbalance within 10g will not affect the driving stability of the motorcycle.* ○*Please do not use more than 4 weights (including 4, total weight of more than 90 g). If you need to control the balance with the wheel of more than 4 weights, please disassemble the wheel to find the cause of the problem.*

b. Rotate the rim by 90°, and make the gravity point at the place shown in the figure below.



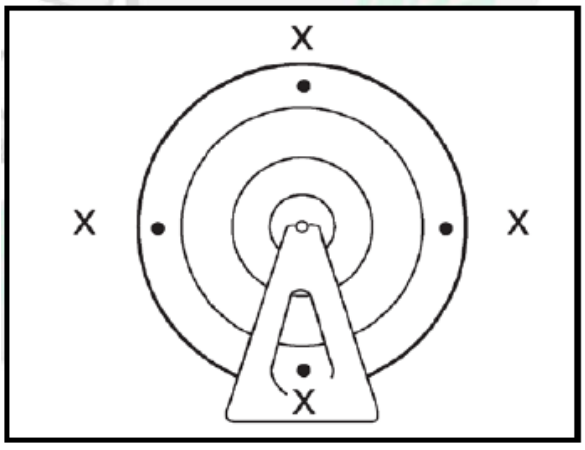
c. If gravity point does not stop at one place, please use a heavier weight;

d. Repeat Steps [b] to [c] for several times, until rim is balanced;

•Checking static balance

a. Rotate rim, and confirm that it will stop at all places shown in the figure.

b. If front wheel does not keep still at all positions, please balance it again.



Checking / Adjusting Tire Pressure

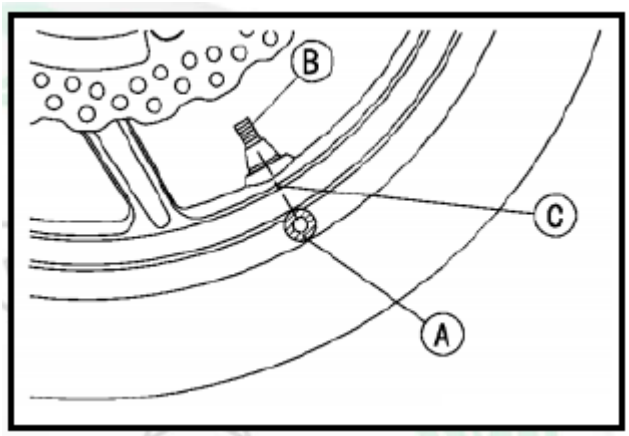
•See “Regular Maintenance”—“Checking Tire Pressure”.

Checking Tire

•See “Regular Maintenance”—“Checking Whether Wheel / Tire Is Damaged”.

Disassembling Tire

•Disassemble:
Tire (see “Disassembling Front Wheel / Rear Wheel),
Air valve (deflate)
•To keep tires balanced, make a mark at the place of air valve rod using a chalk, so as to install the tires at the original places later.
Chalk mark or yellow mark [A],
Air valve [B],
Aligning [C]
•Apply soap or rubber lubricant at tire beads and two rim edges, so that tire beads may slip out from rim edge easily.



Note
Do not use oil or gasoline distillate as lubricant, because oil or gasoline distillate may damage the rubber of the tires.

•Use Tire Clamp to remove tires from rims.

Remark
○*Because tires are embedded firmly at rims, so they cannot be removed using manual tools.*

Installing Tire

Warning
Front and rear wheels must be the products of the same manufacturer!

•Check rims and tires and replace them if necessary.

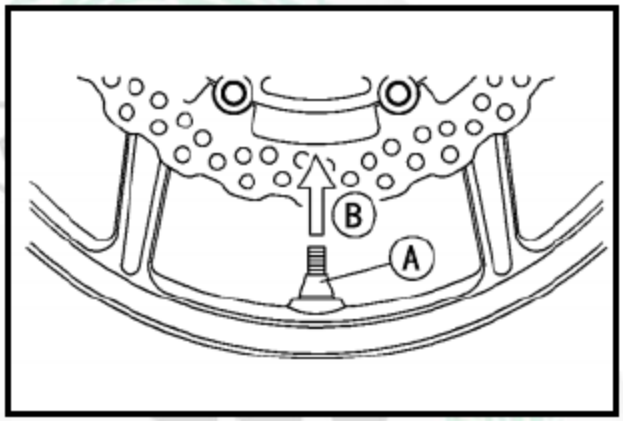
•Clean the sealing surfaces of rims and tires, and make the sealing surface of rim smooth using a fine abrasive cloth if necessary.

•Remove and discard the air valve.

Note
Air valve must be replaced when changing tire! Please do not use it repeatedly!

•Install a new air valve at rim.

○Remove air valve cap, apply soap or rubber lubricant at seal of valve rod [A], pull out [B] air outlet valve rod from the inside of rim, and adjust the place of valve rod.



Note
Do not use oil or gasoline distillate as lubricant of valve rod, because oil or gasoline distillate may damage the rubber of tires.

○The structure of valve is shown in the figure.

Air valve cap [A],

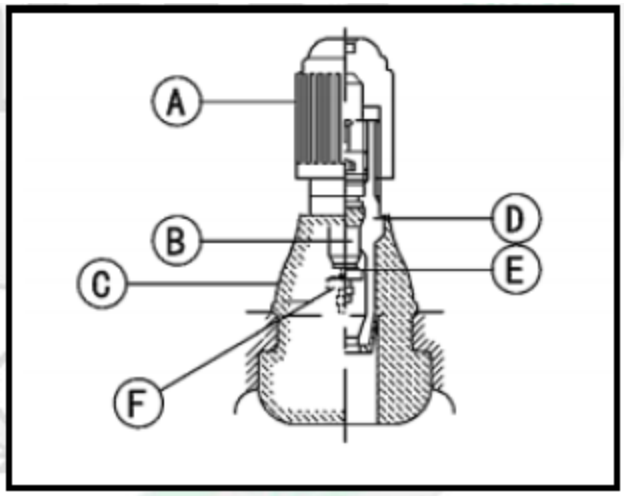
Air valve [B],

Valve rod seal [C],

Valve rod [D]

Air valve seat [E],

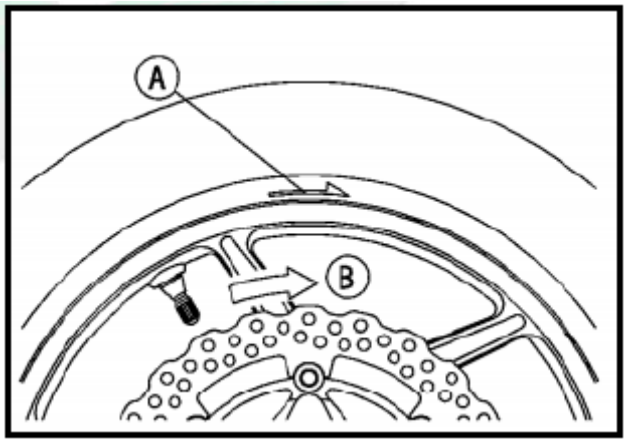
Opening air valve [F]



• Check the tire rotation marks on the front wheel tire and the rear wheel tire, and then install the tires on the corresponding rim.

Tire rotation mark [A]

Rotation direction [B]

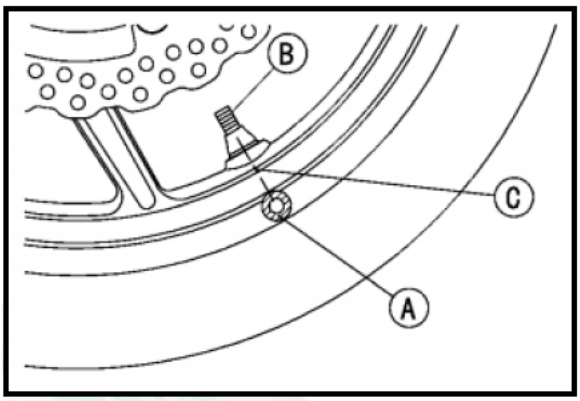


•Put tire on the rim, and align the air valve [A] with the balance mark [B] on the tire (make made with a chalk when the tire is removed or a yellow paint mark on the new tire).

•Install tire bead at the edge of rim using a Tire Clamp.

•Lubricate tire bead and rim edges using soap or a rubber lubricant when inflating the tire, so as to install the tire bead at the sealing surface of rim.

•Align the tire bead at the rim, inject compressed air into the tire until the bead engages with the inner sealing surface of the rim.



⚠Warning

When inflating the tires, be sure to install air valve, and the pressure inside the tire does not exceed 400 kPa (4.0 kgf/cm^2). Excessive inflation may lead to puncture of tire, thus causing casualties:

•Check whether the rim line [A] on both sides of the tire's sidewall is parallel to the edge of the rim.

★ If the edge of the rim is not parallel to the rim line of the tire sidewall, remove the air valve.

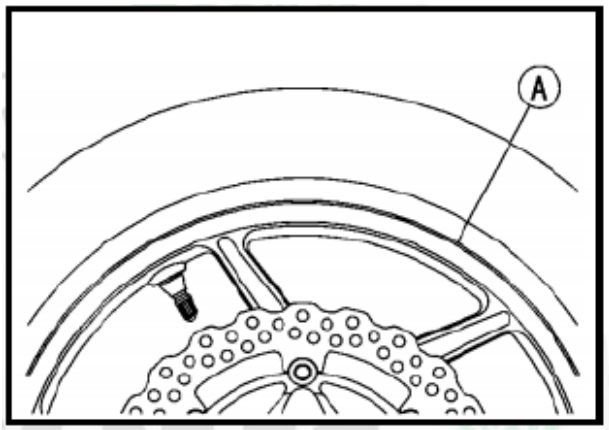
•Lubricate the edges of the rim and bead.

•Install the air valve and re-inflate the tire.

•After installing the bead into the edge of the rim, check the tire for leaks.

○The air inflated to the tire should be slightly higher than the standard inflating volume.

○Apply soap to tire or soak the tire in the water. If there is any air bubble, the tire may leak.



•Adjust the tire pressure according to the specified tire pressure standard (see "Regular Maintenance"—"Checking Tire Pressure").

• Install air valve.

• Adjust the static balance of wheel (see "Adjustment of Static Balance of Rim").

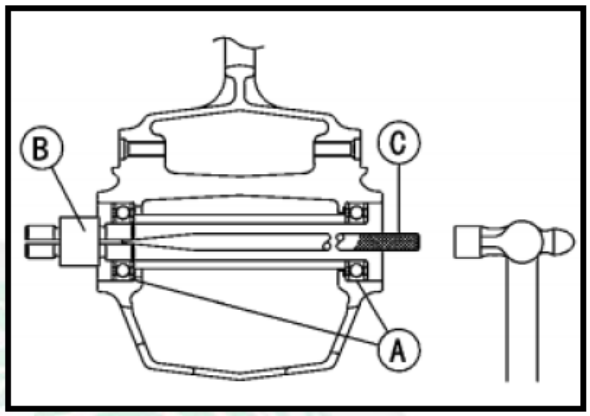
Repairing Tires

There are two methods commonly used to repair Tubeless Tires. One is called "temporary (external) repair": it does not need to remove the tires from the rim to repair; the other is called "permanent (internal) maintenance": it needs to remove the tire to repair. It is generally believed that compared to a temporary (external) repair, permanent (internal) maintenance ensures a more durable and stable tire. In addition, permanent (internal) maintenance has another benefit: associated damage that cannot be found in external examination can be identified in a thorough examination. In view of this, Benelli does not recommend the use of temporary (external) maintenance, only recommend the use of reasonable permanent (internal) maintenance. The repair methods recommended by manufacturers may differ slightly. In order to ensure safe ride, please follow the manufacturer's recommended repair tools and maintenance materials for repairs.

Hub Bearing

Disassembling Hub Bearing

•Remove the wheel (see “Disassembling Front Wheel / Rear Wheel”), and remove the following parts:
shaft collar,
shaft sleeve (removed from rear hub),
oil seal
•Remove the hub bearing [A] with the bearing puller.

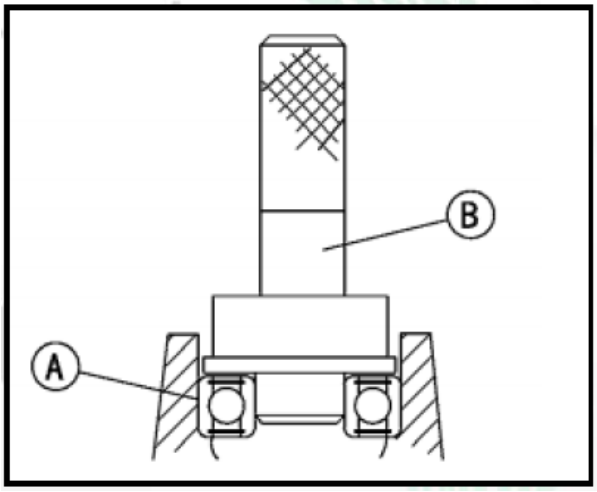


Note
Do not place the wheels horizontally on the floor and make the brake disc face down, or the brake disc may be damaged or deformed. Please put a stop block under the wheel to prevent the brake disc from contacting the ground.

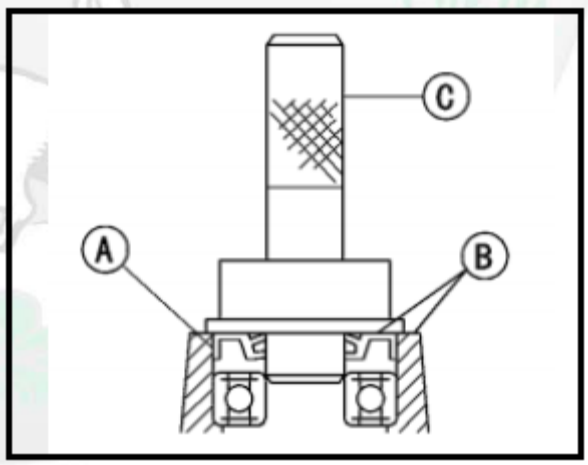
Special Tools—Bearing Remover Head φ25×φ28
Bearing Remover Shaft φ13

Installing Hub Bearing

•Before installing the hub bearing, blow out the dust or foreign materials inside the hub with compressed air to avoid contamination of the bearing.
•Replace the bearings with new ones.
•Install the bearing with the full set of tools for installing bearings (without contact with the inner ring of bearing).
•Press the bearing [A] until it reaches the bottom.
Special Tools—Complete Set of Tools for Installing Bearings [B



•Replace the oil seal.
•Press the oil seal [A], so that the oil seal surface is flush with the end of the hole [B].
○Apply high temperature grease to the edge of the oil seal.
Special Tools—Complete Set of Tools for Installing Bearings [C]



Checking Hub Bearing

Because the error of hub bearing is very small, generally it is unable to measure the clearance.

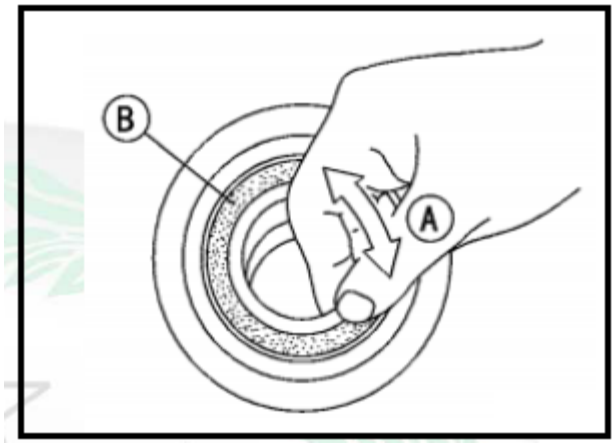
Remark
○Do not remove any bearing for check, because the bearing must be replaced with one after removal.

•If it needs to check whether there is an axial clearance in the bearing, it is jammed or blocked during the rotation, please rotate each bearing in the hub back and forth [A]!

★If the bearing cannot rotate smoothly, please replace the bearing!

•Inspect the bearing seal [B] for damage or leaks.

★If there is damage or leak in bearing seal, please replace the bearing!

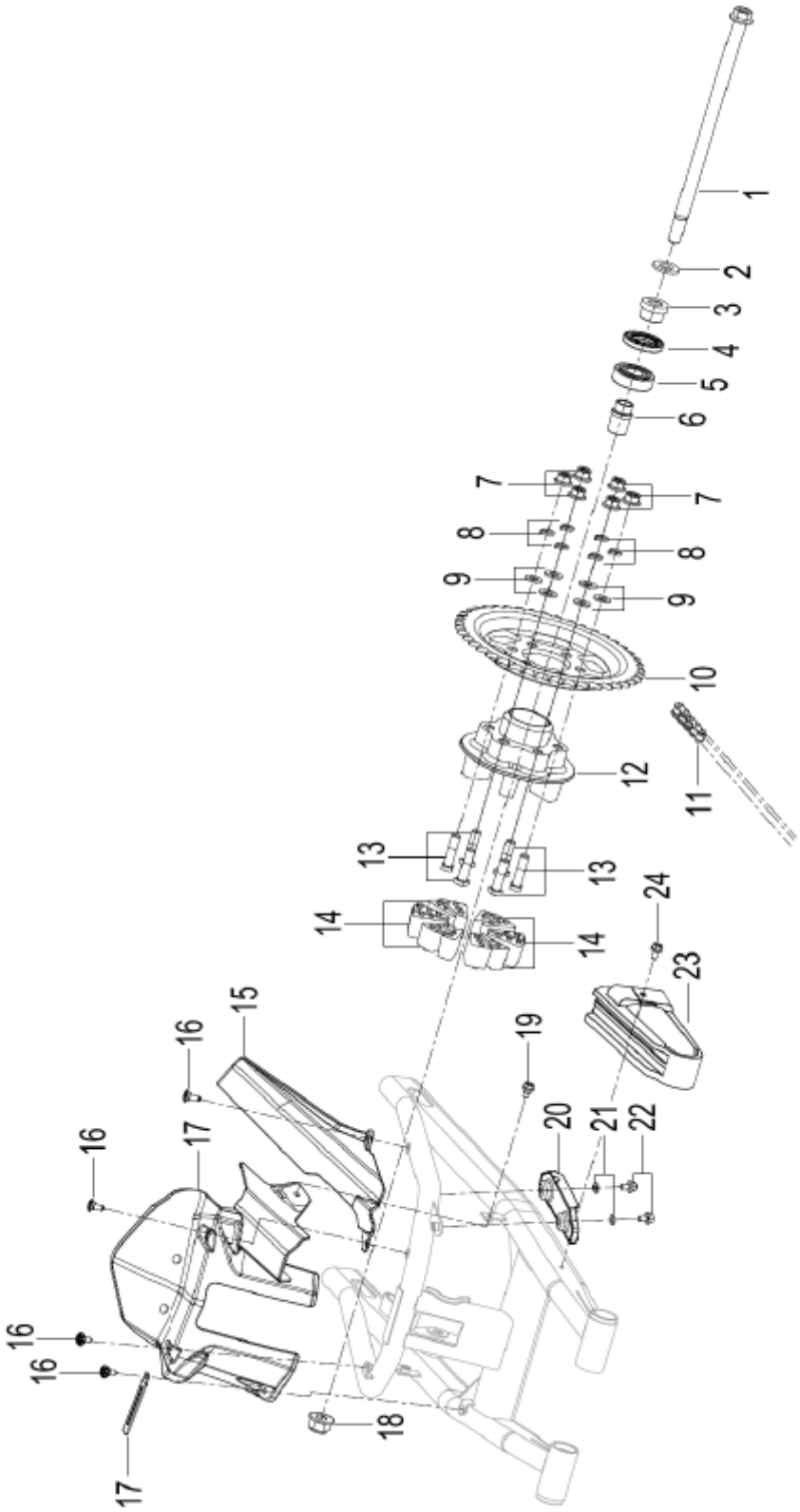


Hub Bearing Lubrication

Remark
○Because there is lubricant in hub bearing and it is sealed, it does not need to add lubricating oil to hub bearing.

Drive Mechanism

Exploded View of Drive Mechanism



No.	Parts and specifications	Torque		Remark
		N·m	kgf·m	
1	Rear Wheel Axle M14×1.5×292	150	15.0	
2	Gasket 16			
3	Left sleeve of rear wheel			Si
4	Dust ring components			Si R
5	Radial Ball Bearing 6204-2RS			Si
6	Chain drive shaft sleeve			
7	Self-locking nut M10×1.25	45	4.5	L
8	Spring gasket φ10			
9	Gasket 10			
10	Sprocket/43 teeth			
11	Chain 520HO-1×108			
12	Sprocket hub			
13	Sprocket installing bolt			
14	Chain guard			
15	Bolt M6×l4	3.9	0.40	
|6	Rear lower fender			
17	Clip components			
18	Self-locking nut M14×1.5	150	15	
19	Bolt M6×14			
20	Upper stop block of chain			G
21	Bolt M6×l0	10	1.0	L
22	Gasket 6			
23	Chain protection block			G
24	Bolt M6×l2	10	1.0	

G: apply grease.

R: replace parts.

L: apply Loctite.

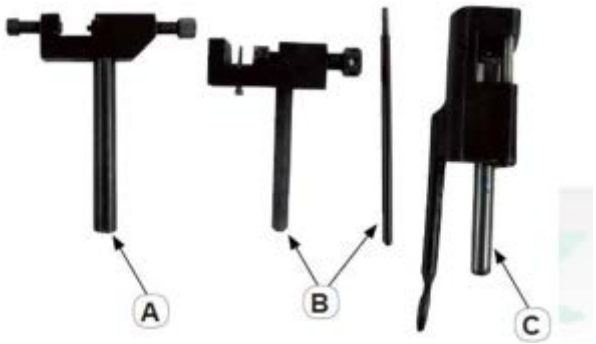
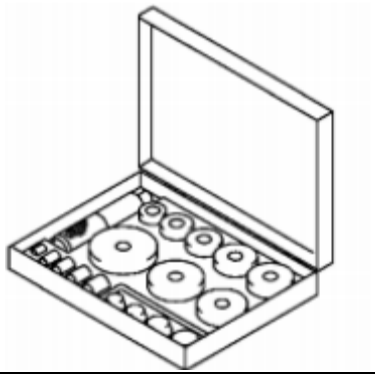
R: replace parts.

Si: apply silicone grease.

Technical Parameters

Item	Standard	Lower Service Limit
Drive chain		
Slackness of drive chain	32-38 mm	——
Wearing capacity of drive chain (with a length of 20 links)	317.5-318.2 mm	323 mm
Standard drive chain:		
Manufacturer		——
Model	520HO	——
Quantity of chains	108 links	——
Sprocket		
Deformation of rear sprocket	≤TIR 0.4 mm	TIR 0.5 mm

Special Tools

Tools for disassembling and assembling chain:	Complete set of tools for installing bearing:
	

Drive Chain

Checking the Slackness of Drive Chain

•See “Regular Maintenance”—“Checking the Slackness of Drive Chain”.

Checking the Slackness of Drive Chain

•See “Regular Maintenance”—“Adjusting the Slackness of Drive Chain”.

Checking / Adjusting Wheel Alignment

•See “Regular Maintenance”—“Checking Wheel Alignment”.

Checking the Wear of Drive Chain

•See “Regular Maintenance”—“Checking the Wear of Drive Chain”.

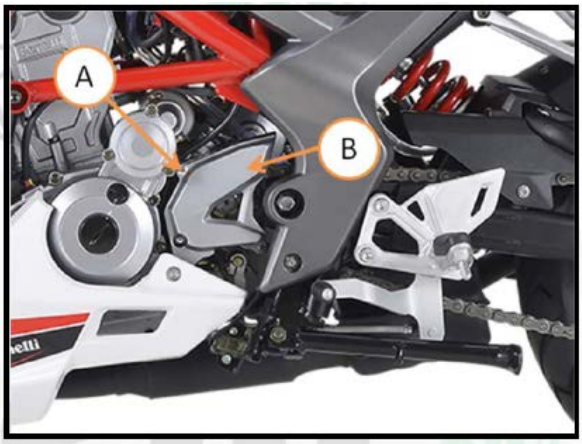
Lubrication of Drive Chain

•See “Regular Maintenance”—“Checking the Lubrication of Drive Chain”.

Disassembling Drive Chain

•Disassemble drive chain cover screw [A] and drive chain cover [B].

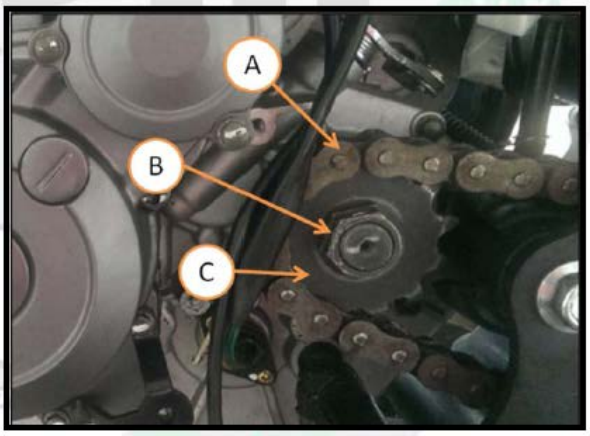
○Disassemble drive chain cover from the swing arm.



•Disassemble:

Drive sprocket locking nut [B]

Engine drive sprocket [C] (see “Disassembling Engine Drive Sprocket”),



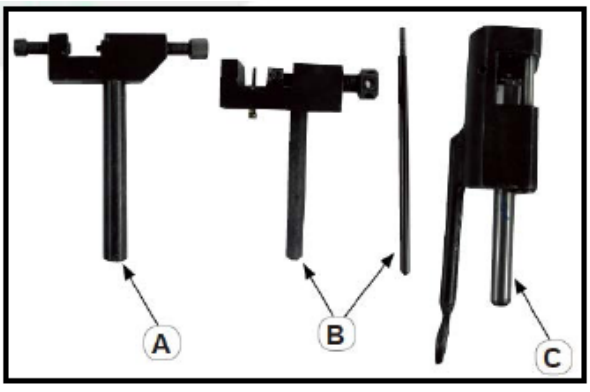
•Disassemble:

Drive chain [A]

•The drive chain used for this chain is equipped with the master link of safety side plate.

•Depending on the chain manufacturer’s specifications and the type required.

•Use special tools. There are three tools to remove the main chain plate [A], assemble side plate [B], and fasten it to the pin at side plate [C]

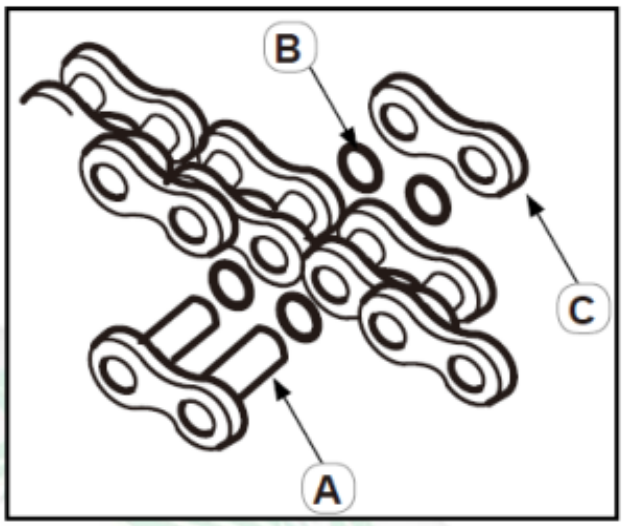


•**Drive Chain**

Main chain plate [A],

Rubber O-ring [B],

Side plate of main chain plate [C],



Remark
○*Insert the main chain plate from the inside of drive chain, and then assemble side plate, make ID sign towards the outside.*

⚠Warning
Do not use old chain, main chain plate, side plate of main chain plate or rubber O-ring.

Installing Drive Chain

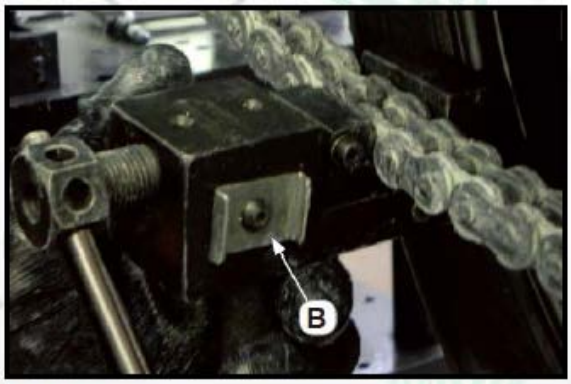
•Install:

Drive sprocket of engine (see “Disassembling Drive Sprocket of Engine”),

rear wheel (see “Wheel / Tire”—“Disassembling Rear Wheel”)

•Install chain:

○Use the tool to assemble the side plate of main chain plate [B], and press the side plate of main chain plate to the main chain plate.



○Use special tools to fix the pin at the main chain plate [C],

Note
There must be no opening at the surface under the impact of fixed main chain plate. If there is any opening, replace main chain plate, sealing ring and side plate.

Remarks
○Do not use the drive chain of main chain plate with clamp.

•Install:

Drive chain cover

•Adjust the slackness of drive chain after installing drive chain (see “Regular Maintenance”—“Adjusting the Slackness of Drive Chain”)

Sprocket, Shaft Sleeve, Shaft Sleeve Bearing

Disassembling Rear Sprocket

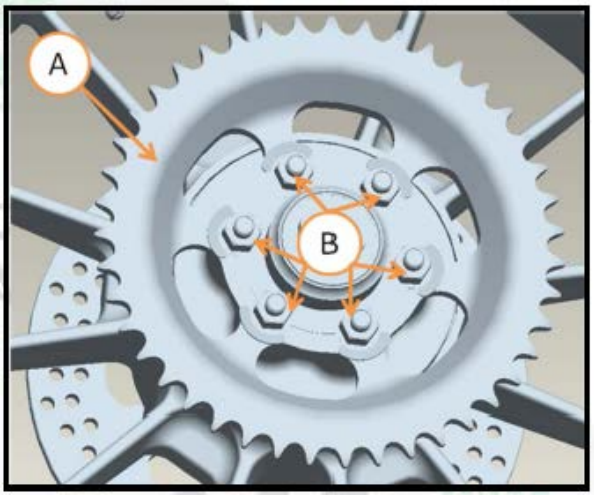
•Disassembling rear wheel (see “Wheel / Tire”—“Disassembling Rear Wheel”).

Note
Do not place the wheel on the ground horizontally and make the brake disc towards, otherwise, brake disc may be damaged or deformed. Please place wood blocks below wheel, to prevent brake disc from contacting the ground.

•Disassemble:

Rear sprocket nut [A],

Rear sprocket [B]



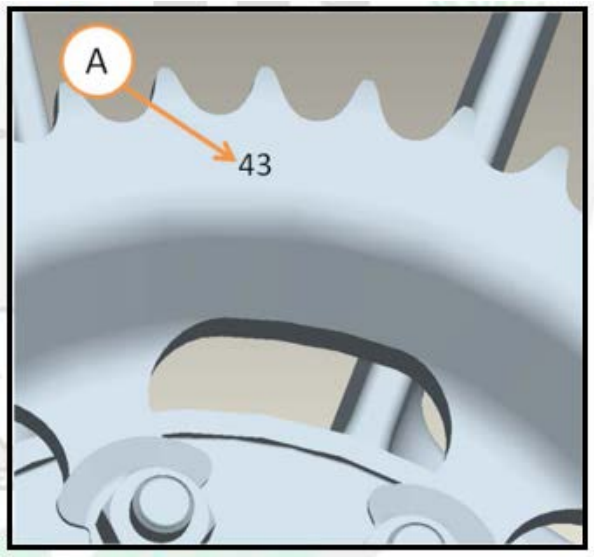
Installing Rear Sprocket

•When installing the sprocket, the side with the sign of number of teeth [A] should be towards the outside.

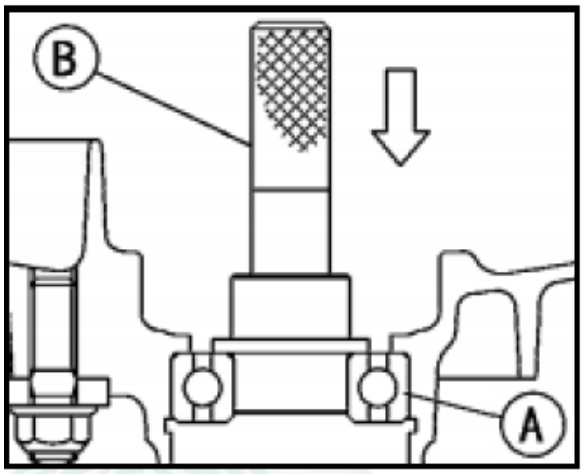
•Lock rear sprocket nut.

Locking Torque of Rear Sprocket Nut: 45N·m

•Install rear wheel (see “Wheel / Tire”—“Installing Rear Wheel”).



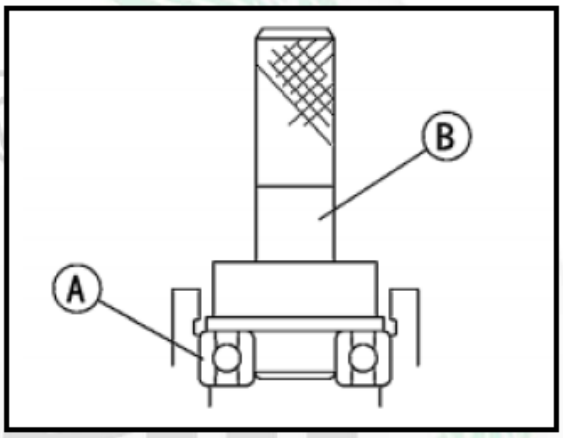
Disassembling Shaft Sleeve Bearing



•Knock out the bearing [A] from one side of wheel.

Special Tools—Complete Set of Tools for Installing Bearing:

Installing Shaft Sleeve Bearing



•Replace one new bearing.

•Press bearing [A] towards the inside, until it reaches the top.

Special Tools—Complete Set of Tools for Installing Bearing [B]:

•Apply high-temperature grease to the bearing.

•Replace one new oil seal.

•When pressing it into the new oil seal, the sealing surface should be aligned at the end of hole.

○Apply high-temperature grease to the edge of oil seal.

Special Tools—Complete Set of Tools for Installing Bearing:

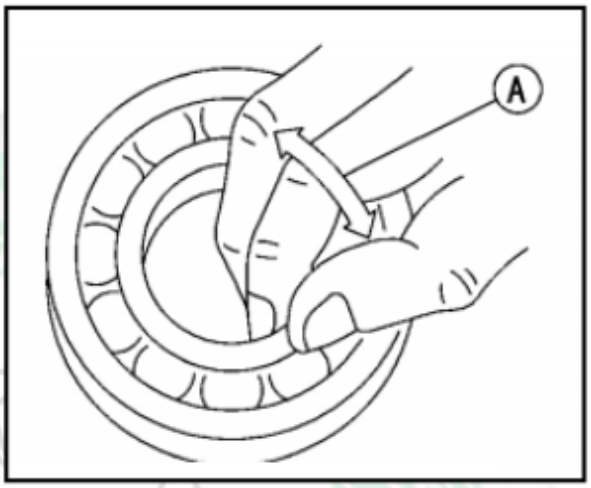
Checking Shaft Sleeve Bearing

•As the shaft sleeve bearing error is very small, generally it is unable to measure the clearance.

Remark
○Do not remove any bearing for check, because the bearing must be replaced with one after removal.

•If it needs to check whether there is an axial clearance in the bearing, it is jammed or blocked during the rotation, please rotate each bearing in the hub back and forth [A]!

★If the bearing cannot rotate smoothly, please replace the bearing!



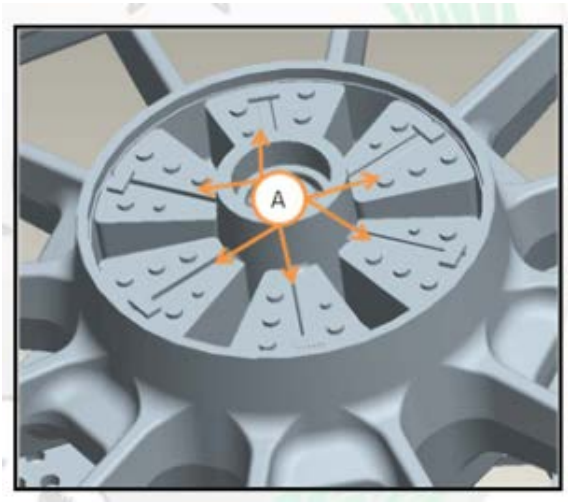
Lubrication of Shaft Sleeve Bearing

•Add high-quality bearing grease to bearing. Rotate the bearing for several times by hands to ensure that the grease distribution in the bearing is uniform.

Checking the Buffer Block of Shaft Sleeve

•Remove the shaft sleeve of rear wheel and check the rubber buffer block [A].

•If the buffer block is damaged or corroded, please replace it!



Checking the Wear of Sprocket

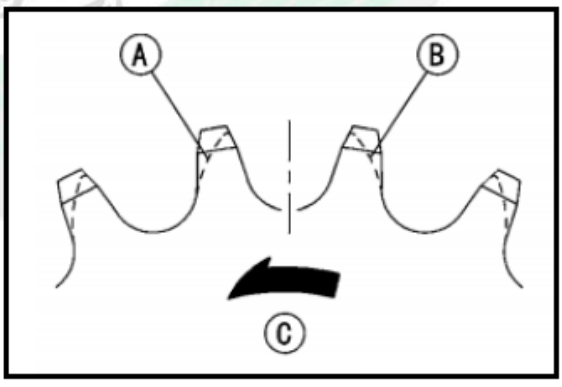
•Visually check the wear of engine and rear sprocket.

★If the wear of sprocket teeth is as shown in the figure, please replace the sprocket and check the wear of drive chain (see “Regular Maintenance”—“Checking the Wear of Drive Chain”).

Worn sprocket tooth (drive chain of engine) [A],

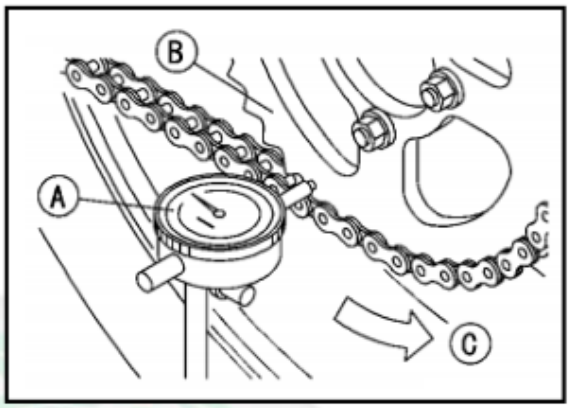
Worn sprocket tooth (rear sprocket) [B]

Rotation direction [C]



Remark
○*If it needs to replace sprocket, drive chain may need to be replaced. Therefore, it is required to check drive chain when replacing sprocket.*

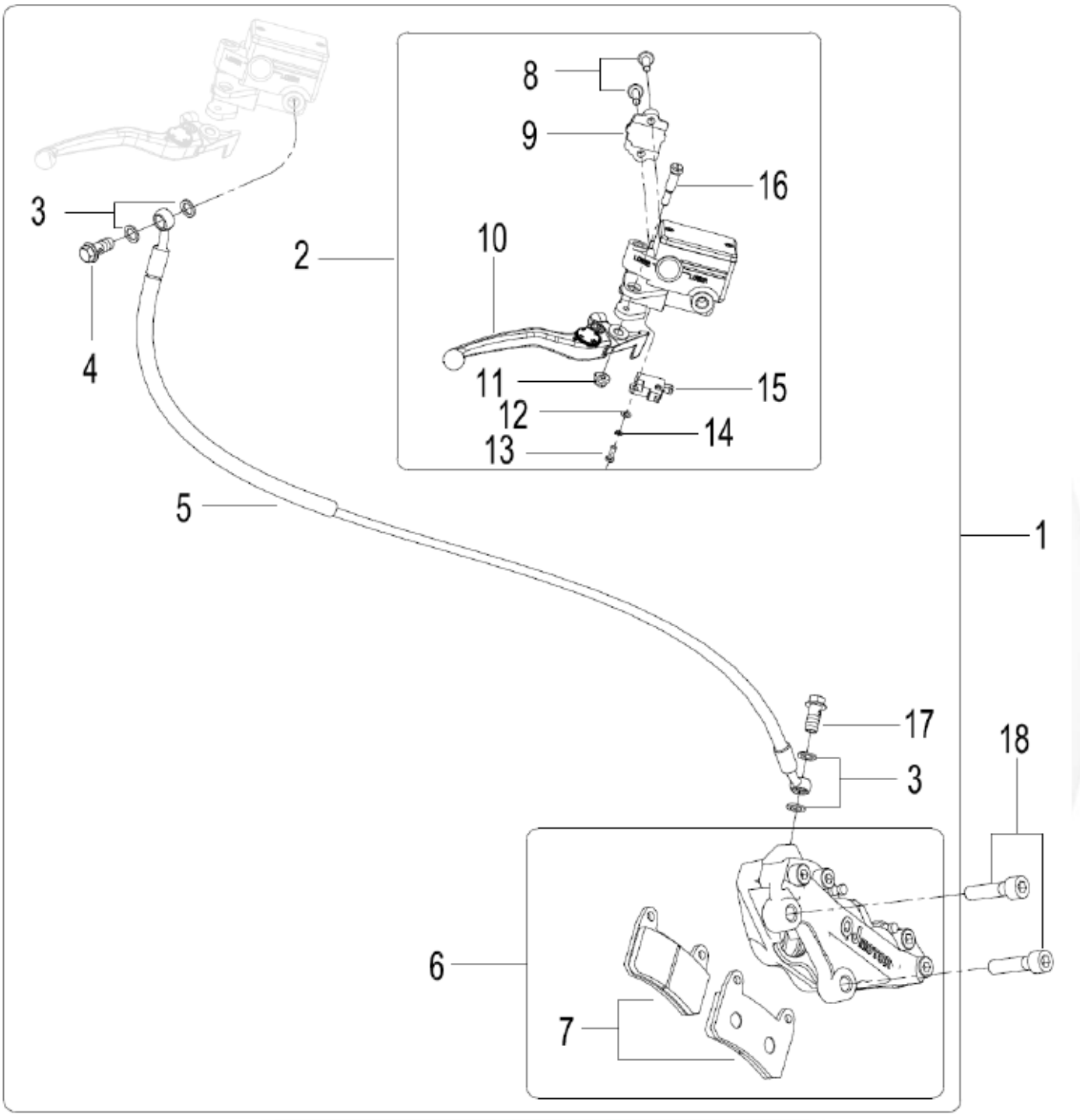
Check the Deformation of Rear Sprocket



•Lift the rear wheel from the grounding using a bracket, so that it can rotate smoothly.
•As shown in the figure, place a dial indicator [A] near the gear teeth [B] of the rear sprocket.
Turn the rear wheel [C] and measure the runout (deformation) of sprocket. The difference between the maximum and minimum readings of the dial indicator is the runout (deformation) of the sprocket.
★If the wheel shaft runout exceeds the lower Service Limit, please replace the rear sprocket!
Deformation of Rear Sprocket
Standard: ≤TIR 0.4mm
Upper Service Limit: TIR 0.5 mm

Brake

Exploded View of Front Brake



No.	Parts and specifications	Torque		Remark
		N·m	kgf·m	
1	Front hydraulic brake components			
2	Master Cylinder components			
3	Gasket			
4	Brake hose installing bolt	25	2.5	
5	Front hydraulic brake hose assembly			
6	Brake Caliper components			
7	Brake Pads components			
8	Bolt M×23	10	1.0	
9	Fixing cover			
10	Hydraulic brake handle/pedal components			
11	Self-locking nut M6	10	1.0	
12	Screw M4×l2	2	0.2	
13	Gasket 4			
14	Lightened spring gasket 4			
15	Brake switch components			
|6	Handle mounting bolt	6	0.6	
17	Brake hose installing bolt	25	2.5	
18	Socket head cap screw M10×l.25×40	45	4.5	L

B: apply brake fluid.

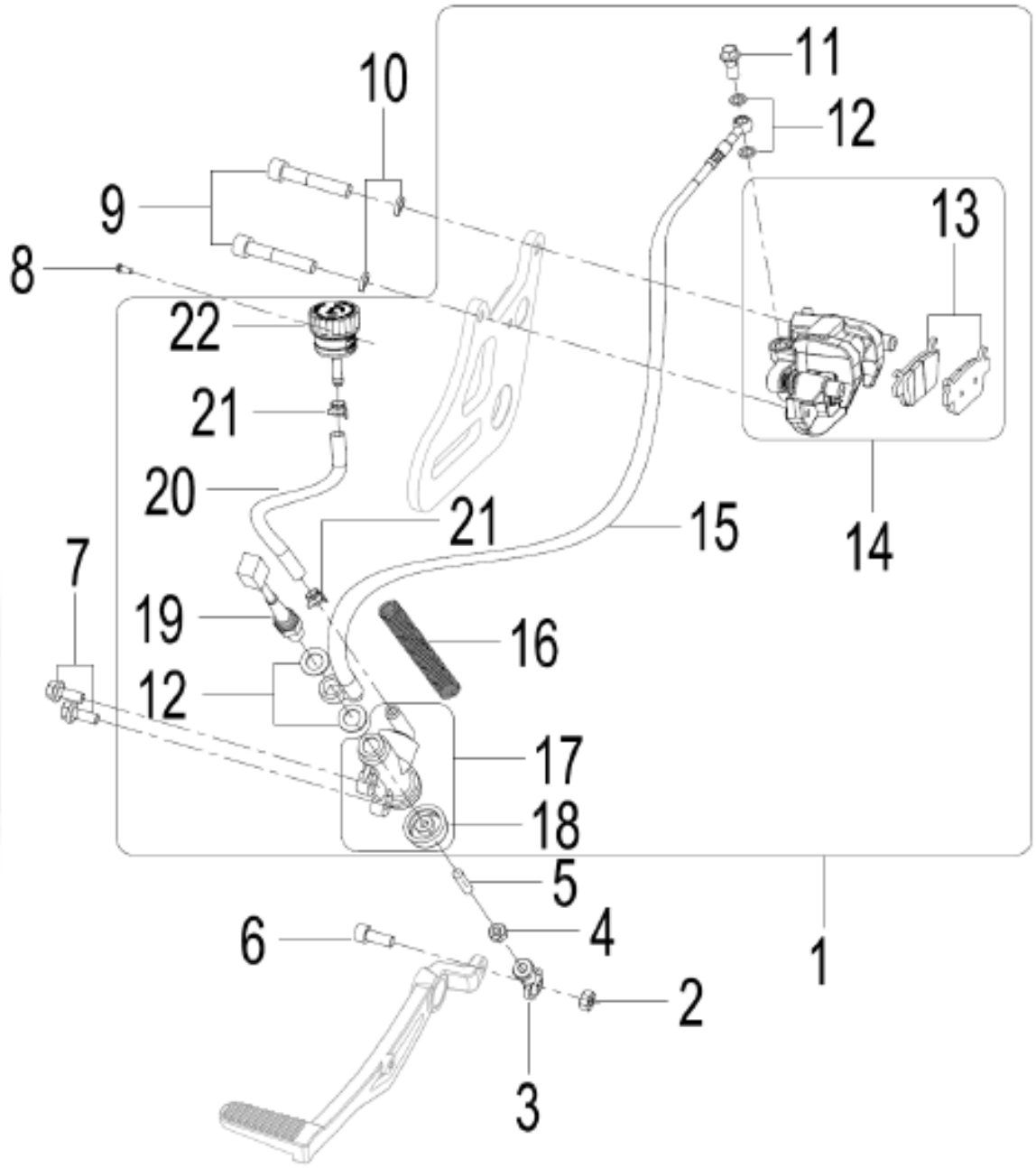
G: apply grease.

L: apply Loctite.

R: replace parts.

Si: apply silicone grease.

Exploded View of Rear Brake



No.	Parts and specifications	Torque		Remark
		N·m	kgf·m	
1	Rear hydraulic brake components			
2	Self-locking nut M6	8	0.8	
3	Joint M6	8	0.8	
4	Thin nut M6	8	0.8	
5	Foot mounted pump plunger screw	8	0.8	
6	Bolt M6×l×20	10	1.0	
7	Screw M6×25-8.8-ZG	10	1.0	
8	Screw M6×15.2	10	1.0	
9	Bolt M8×l.25×20	22	2.2	L
10	Spring gasket φ8			
11	Brake hose mounting bolt	25	2.5	
12	Gasket			
13	Brake Pads components			
14	Brake Caliper components			
15	Rear brake hose assembly			
|6	Brake hose protection spring			
17	Rear Master Cylinder components			
18	Plunger dust cover			
19	Brake switch components	25	2.5	
20	Brake Fluid ReservoirBrake Fluid Reservoir Ø 12.5×Ø 7×380			
21	Clamp			
22	Brake Fluid Reservoir components			

B: apply brake fluid.

G: apply grease.

L: apply Loctite.

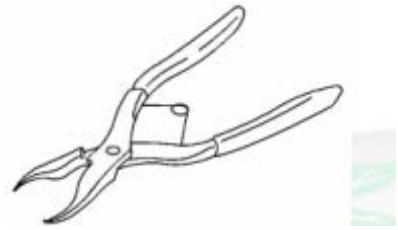
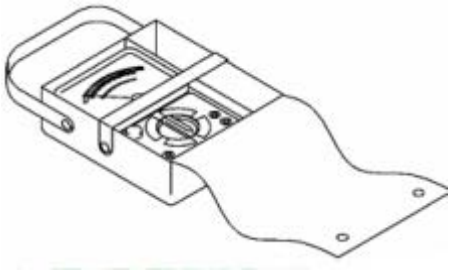
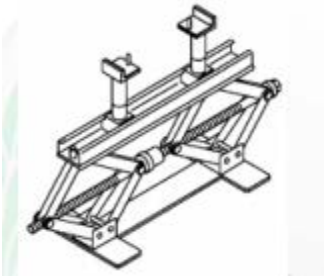
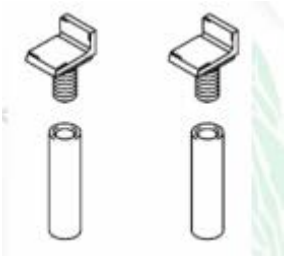
R: replace parts.

Si: apply silicone grease.

Technical Parameters

Item	Standard	Lower Service Limit
Brake handle/pedal, brake pedal Brake handle/pedal position	4-way adjustable (for the selection by rider）	——
Brake handle/pedal free clearance	Not adjustable	——
Pedal free clearance	Adjustable	——
Pedal position	About 45 mm below the top of pedal	——
Brake Pads Thickness of Brake Pads		
Front Brake Pads	5.0 mm	1 mm
Rear Brake Pads	5.0 mm	1 mm
Brake disc Thickness:		
Front brake disc	4.8-5.0mm	4.5 mm
Rear brake disc	4.8 -5.0 mm	4.5 mm
	≤TIR 0.15 mm	TIR 0.3 mm
Brake fluid Grade	DOT4	——

Special Tools

Inside circlip plier	Multimeter
	
Jack:	Jack accessories:
	

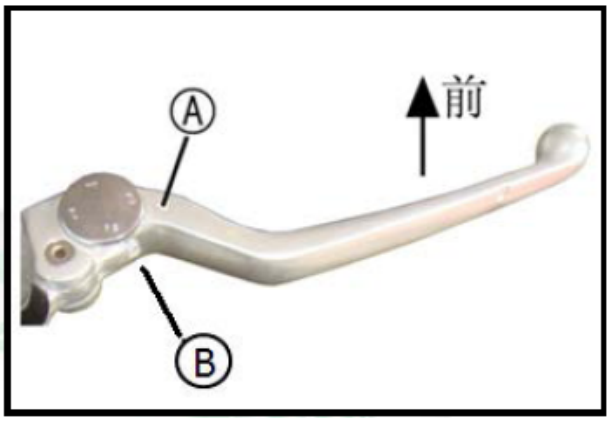
Brake handle/pedal, Brake Pedal

Adjusting the Position of Brake handle/pedal

•There are 4 positions at brake handle/pedal adjuster, so that the rider can adjust the position of brake handle/pedal according to the size of their hands.

•Push the brake handle/pedal forward and turn the adjuster [A], so that the number is aligned with the arrow mark [B] at brake handle/pedal.

○ When the arrow marks is aligned with number 4, the distance between the brake grip and brake handle/pedal is the minimum; when the arrow marks is aligned with number 1, the distance between the brake grip and brake handle/pedal is the maximum.



Checking the Position of Brake Pedal

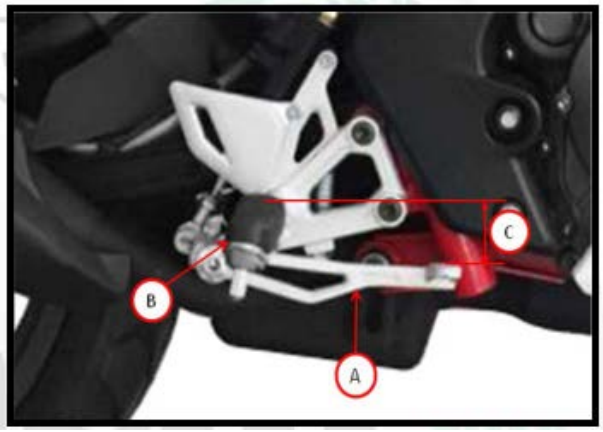
•Check whether the position of brake pedal [A] is correct.

Pedal [B]

Pedal Position [C]

Standard: about 45 mm below the top of pedal

★If the position of pedal is incorrect, adjust the position of brake pedal.



Adjusting the Position of Brake Pedal

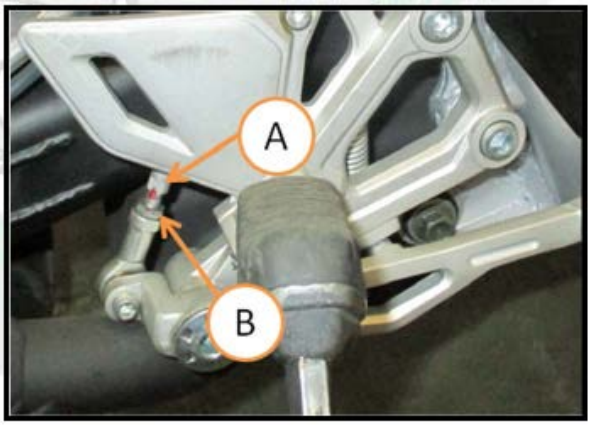
Remark
○*It is not necessary to adjust the position of pedal normally, but if the lever locking nut is removed, the position of pedal must be adjusted.*

•Loosen the locking nut [A], turn the push rod and adjusting nut [B], make the position of pedal
correct.

•Locking torque:

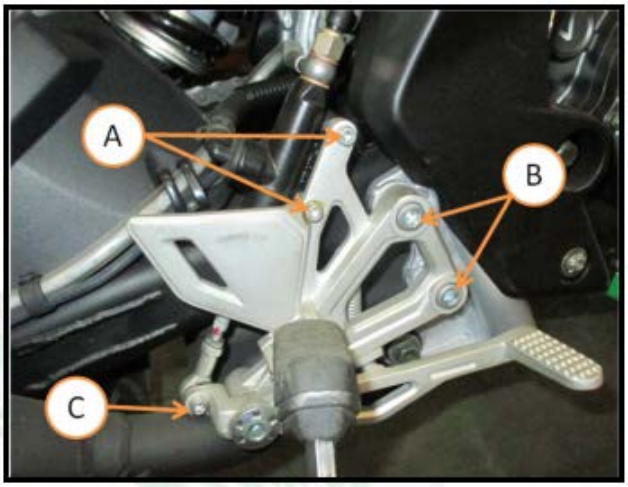
Locking Torque of Push Rod Locking Nut of Rear Master Cylinder: 10 N•m

•Check whether the brake lamp switch is normal (see “Regular Maintenance”—“Checking Whether the Brake Lamp Switch is Normal”).

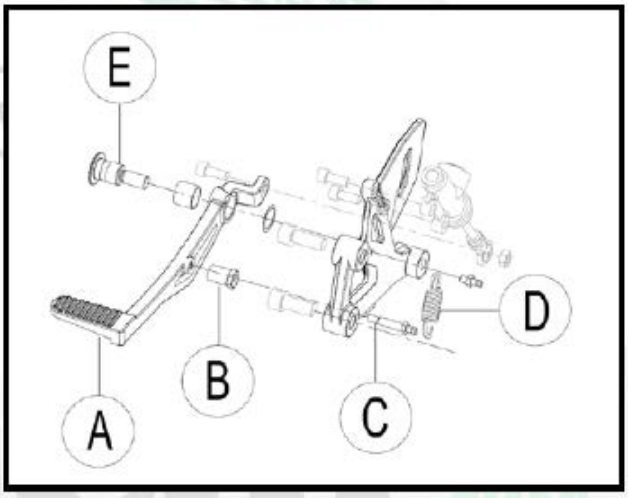


Removing the Brake Pedal

•Disassemble:
Rear Master Cylinder mounting bolt [A],
Right Front Pedal Bracket Bolt [B]
Section Locking Screw [C]

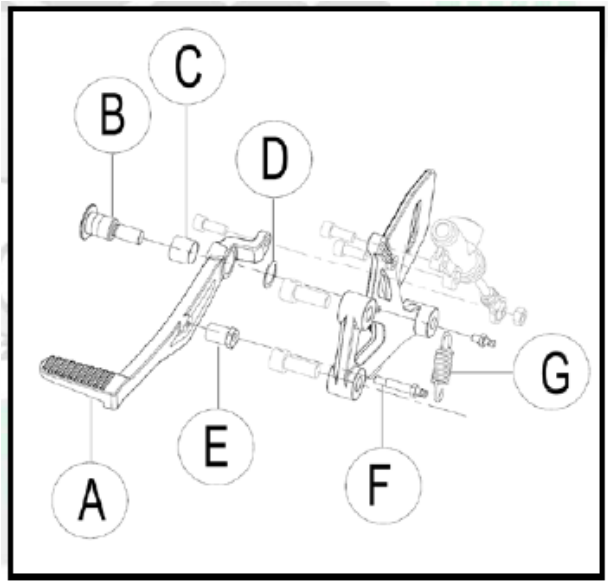


•Disassemble:
Brake pedal return spring [D]
Eccentric push rod [B],
Lower spring pin [C],
•Disassemble the rear brake pedal installing screw [E], and remove the brake pedal [A].



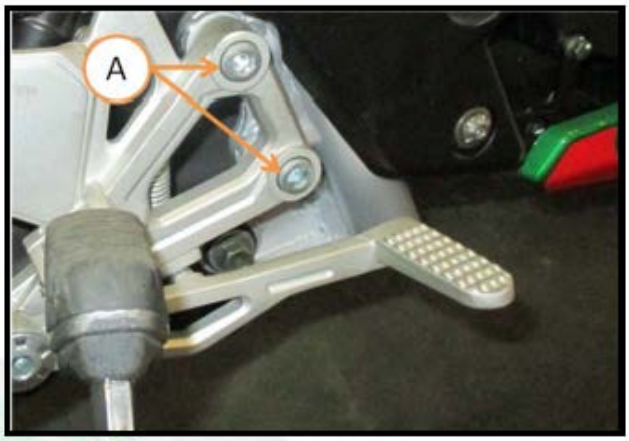
Installing the Brake Pedal

•Install:
Self-lubricating sleeve [C].
Eccentric push rod [E],
Lower spring pin [F],
Locking Torque of Lower Spring Pin: 3N•m
•Apply grease to the rear brake pedal installing screw [B]
•Install:
Brake pedal [A],
Gasket [D],
Rear brake pedal installing screw [B]
Locking Torque of Brake Pedal Bolt: 22 N•m
•Attach the lower end of the brake pedal return spring [D] to the lower spring pin.
•Attach the upper end of the brake pedal return spring [D] to the hook of the pedal.



•Install the right front pedal bracket.

Locking Torque of Front Pedal Bracket Screw [A]: 40N•m



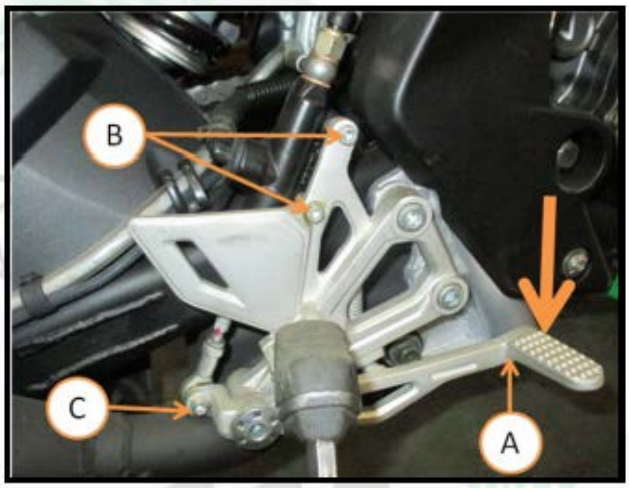
•Install Brake Master Cylinder mounting bolt [B].

Locking Torque of Rear Master Cylinder Fixing Screw [A]: 10N•m

•Press the brake pedal [A], align the joint hole of the Brake Master Cylinder, and install the mounting bolt [C] and nut.

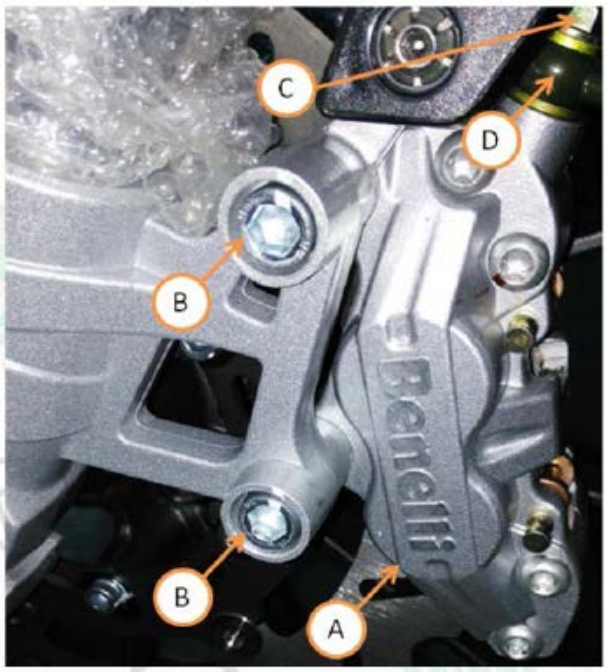
Locking Torque of Rear Master Cylinder Joint Fixing Screw [A 10N•m

•Check the position of brake pedal (see “Position of Brake Pedal”).



Calipers

Disassembling Front Calipers



•Loosen the banjo bolt [C] at the bottom of the brake hose, and then tighten it slightly.

•Remove the calipers mounting bolt [B], the separation calipers [A] and the brake disc.

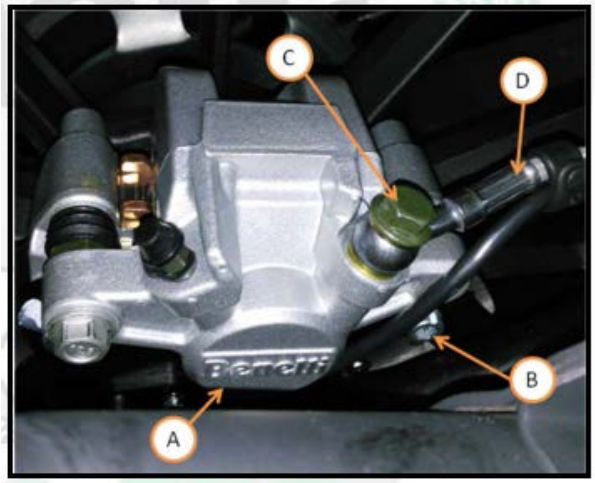
Note
Do not remove the calipers mounting bolts. To remove calipers, simply remove the calipers mounting bolt, because brake fluid may leak after removing calipers mounting bolt.

•Remove banjo bolt and brake hose at calipers [D]

Note
If brake fluid spills out, please rinse immediately!

Remark
○ *If it needs to dismantle after removing the calipers and there is no compressed air available, dismantle the calipers before removing the brake hose (see "Disassembling Front Calipers").*

Disassembling Rear Calipers



•Loosen the banjo bolt [C] at the bottom of the brake hose, and then tighten it slightly.

•Remove the calipers mounting bolt [B], the separation calipers [A] and the brake disc.

Note
Do not remove the calipers mounting bolts. To remove calipers, simply remove the calipers mounting bolt, because brake fluid may leak after removing calipers mounting bolt.

•Remove banjo bolt and brake hose at calipers [D]

Note
If brake fluid spills out, please rinse immediately!

Remark
○ *If it needs to dismantle after removing the calipers and there is no compressed air available, dismantle the calipers before removing the brake hose (see "Disassembling Rear Calipers").*

Installing the Calipers

•Install the caliper and the lower end of brake hose.

○Replace the gaskets on both sides of the hose joint with new ones

•Locking torque:

Locking Torque of Calipers Mounting bolt:

Front calipers: 34 N•m

Rear calipers: 25 N•m

Brake hose banjo bolt: 25 N•m

•Check the fluid level in the brake fluid cup.

•Exhaust air from the brake pipe (see “Air Bleeding in the Brake Pipe”).

•Check whether the braking performance of the brakes is normal and the brake fluid leaks.

⚠Warning

○Grasp the brake handle/pedal, until Brake Pads is against the brake disc, so that the brake handle/pedal can function as normal. Do not ride the motorcycle before you complete the above steps! Because if you do not complete the above operation, brake may not work normally when being used for the first time and thus danger is caused.

Disassembling Front Calipers

•See “Regular Maintenance” —“Replacing Rubber Parts of Calipers”.

Assembling Front Calipers

•See “Regular Maintenance” —“Replacing Rubber Parts of Calipers”.

Disassembling Rear Calipers

•See “Regular Maintenance” —“Replacing Rubber Parts of Calipers”.

Assembling Rear Calipers

•See “Regular Maintenance” —“Replacing Rubber Parts of Calipers”.

Checking the Oil seal of the Calipers for Damage

In order to maintain a gap between the Brake Pads and the brake disc, an oil seal (piston oil seal) is provided around the piston [A]. If the oil seal is damaged, excessive wear will be cause to Brake Pads, thus leading to brake failure, so that the brake disc or brake fluid temperature may rise.

•If any of the following conditions occur in oil seal, replace it!

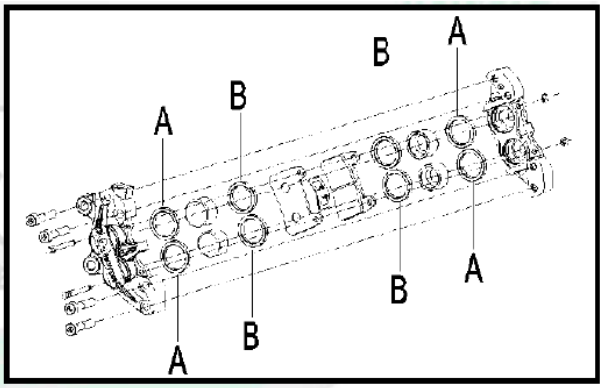
○The brake fluid around the Brake Pads leaks.

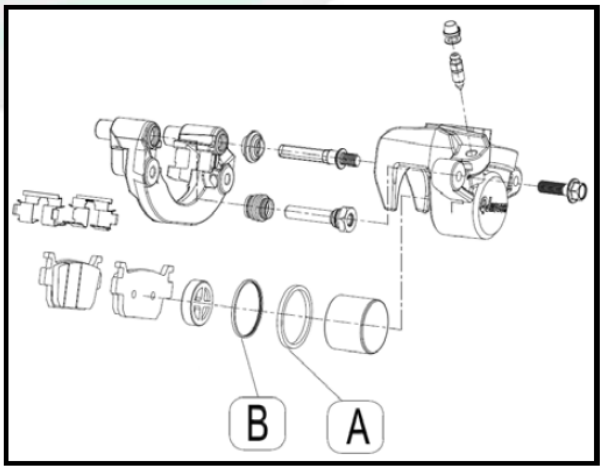
○Brake temperature is too high.

○The difference between the inner and outer surfaces of the Brake Pads is very large.

○Oil seal and piston are stuck together.

★ If you replace the oil seal, please replace the dust seal [B] at the same time. In addition, replace all oil seals when replacing the Brake Padss.





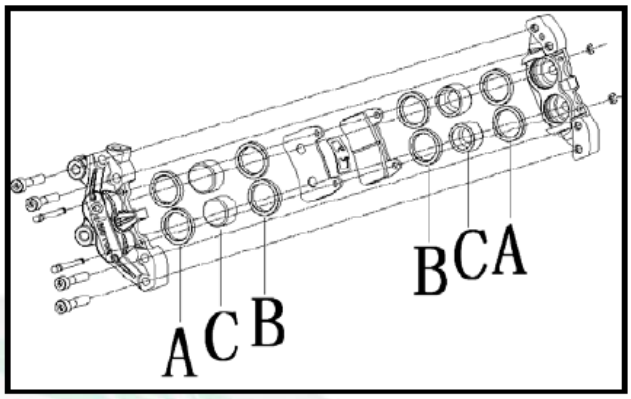
Checking Dust Seal of the Calipers for Damage

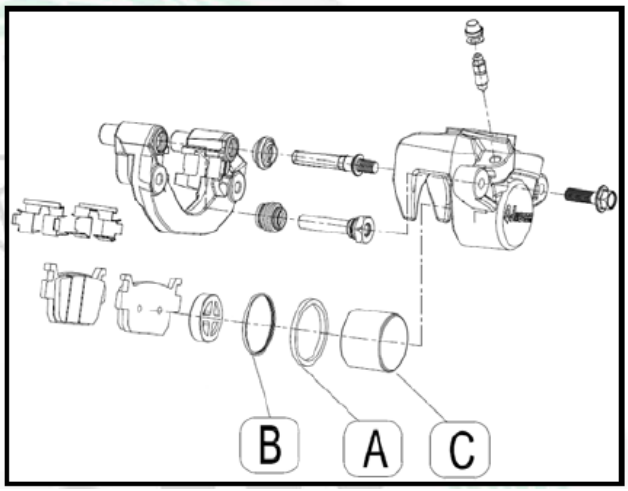
•Check dust seal [B] for cracks, abrasion, expansion or other damages.

★If the dust seal is damaged, please replace it with a new one!

Piston [C],

Oil seal [A]

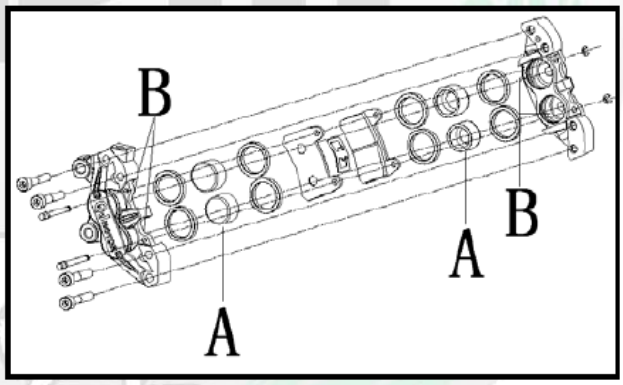


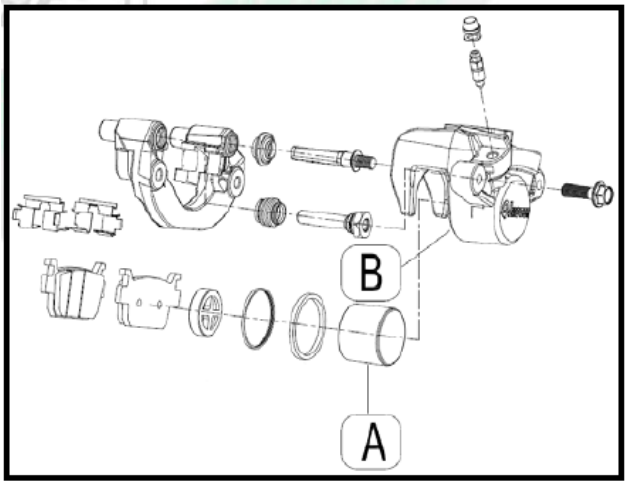


Checking the Calipers Piston and Brake Caliper for Damage

•Visually inspect the piston [A] and the Brake Caliper surface [B].

★ If the Brake Caliper and piston are seriously worn or rusted, please replace the calipers!





Brake Pads

Disassembling Front Brake Pads

•Disassemble front calipers

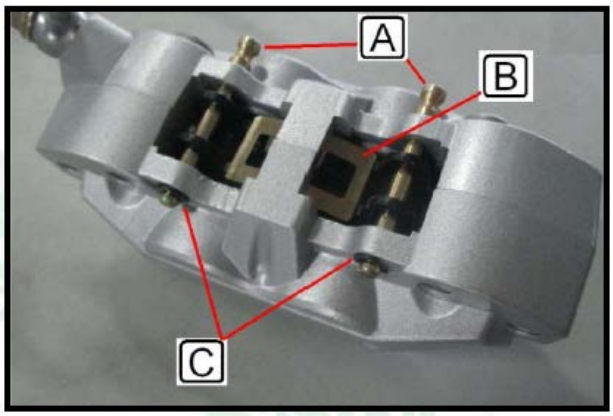
•Disassemble the fixed pin of Brake Pads[A].

•Disassemble:

Fixing pin of Brake Pads [A],

Spring plate of Brake Pads [B],

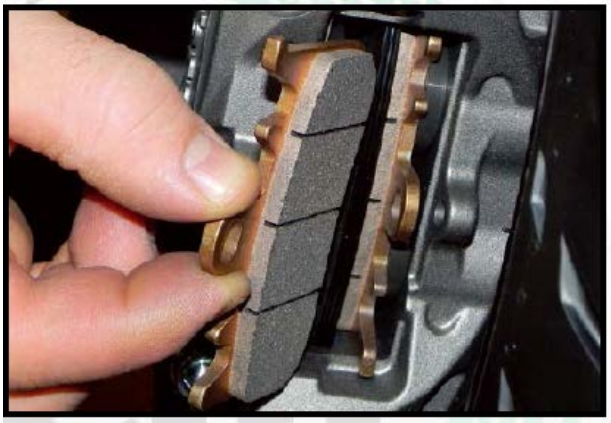
Fixing pin clip of Brake Pads [C]



Note
When pulling out pin A, please press safety spring B

•Disassemble:

Front Brake Pads



Installing Front Brake Pads

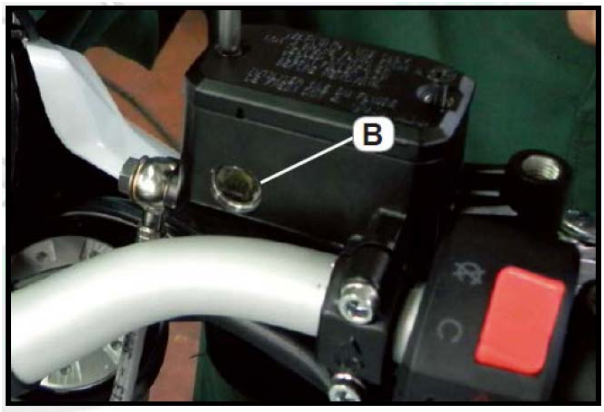
•Push the calipers inward as far as possible.

•Install:

The operations should be conducted in reverse order of disassembly.

•Check: brake fluid level [B], if it is lower than the low limit, add sufficient brake fluid recommended until it reaches the correct level.

•Check: brake handle/pedal operation, if the brake handle/pedal feels loose and soft, or light and soft, empty the air from the brake circuit.

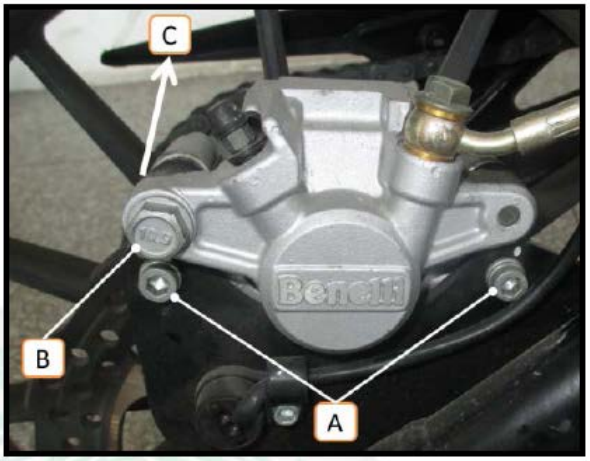


⚠Warning
○Grasp the brake handle/pedal, until Brake Pads is against the brake disc, so that the brake handle/pedal can function as normal. Do not ride the motorcycle before you complete the above steps! Because if you do not complete the above operation, brake may not work normally when being used for the first time and thus danger is caused.

Disassembling Rear Brake Pads

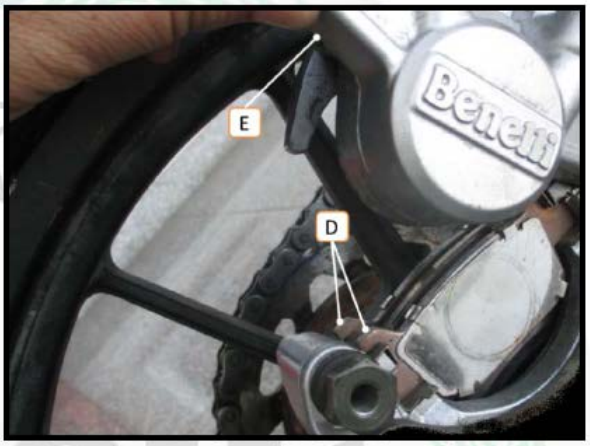
•Disassemble calipers mounting bolt [A].

•Disassemble bolt [B] from brake calipers, and rotate rear calipers [E] in the direction of C.



•Disassemble:

Brake Pads [D]



Installing Rear Brake Pads

•Push the calipers inward as far as possible.

•Install:

The operations should be conducted in reverse order of disassembly.

•Install calipers (see “Installing Calipers”)

•Check: brake fluid level [A], if it is lower than the low limit, add sufficient brake fluid recommended until it reaches the correct level.

•Check: brake handle/pedal operation, if the brake handle/pedal feels loose and soft, or light and soft, empty the air from the brake circuit.

⚠Warning

○Grasp the brake handle/pedal, until Brake Pads is against the brake disc, so that the brake handle/pedal can function as normal. Do not ride the motorcycle before you complete the above steps! Because if you do not complete the above operation, brake may not work normally when being used for the first time and thus danger is caused.

Checking the Wear of Brake Pads

•See “Regular Maintenance”—“Checking the Wear of Brake Pads”.

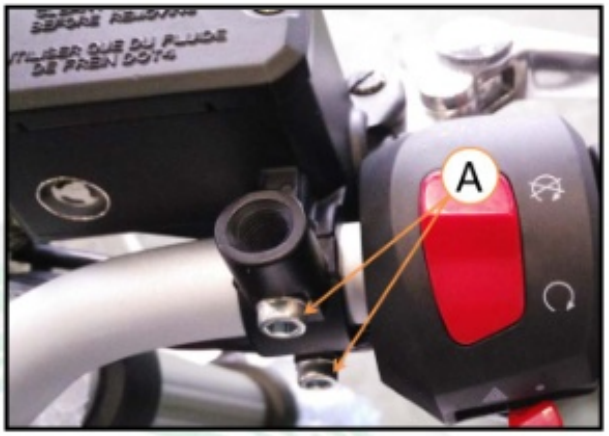
Brake Master Cylinder

Disassembling Front Brake Master Cylinder

•Disassemble the mounting bolt of front Brake Master Cylinder [A].

•Disconnect the connector of front brake lamp switch [E].

Note
If brake fluid spills out, please rinse immediately!



•Disassemble:

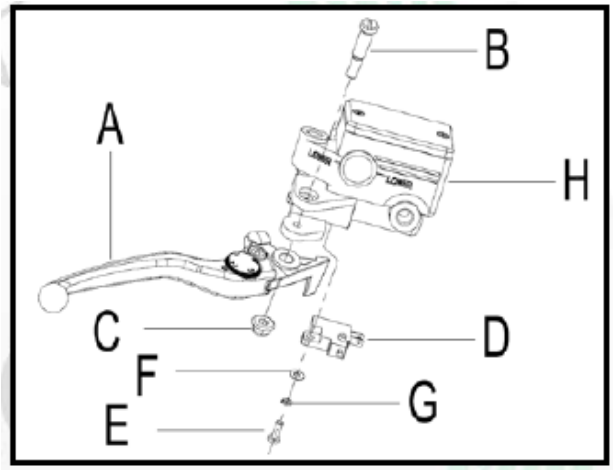
Brake handle/pedal pivot bolt [B] and locking nut [C]

Brake handle/pedal [A],

front brake lamp switch mounting bolt [B], flat washer [F] and spring washer [G]

Front brake lamp switch [D]

Front Brake Master Cylinder [H]



Installing Front Brake Master Cylinder

•Install:

The operations should be conducted in reverse order of disassembly.

•First tighten the upper tightening bolts and then the lower tightening bolts.

Locking Torque of Front Main Cylinder Tightening Bolt: 11 N•m

•Replace the gaskets on both sides of the hose joint with new ones.

•Locking torque:

Locking Torque of Banjo bolt of Brake Hose: 25 N•m

•Exhaust air from the brake pipe (see “Air Bleeding in the Brake Pipe”).

•Check whether the braking performance of the brakes is normal and the brake fluid leaks.

Disassembling Rear Brake Master Cylinder

•Disassemble:

Rear Brake Master Cylinder tightening bolts [A]

Bolt [B]

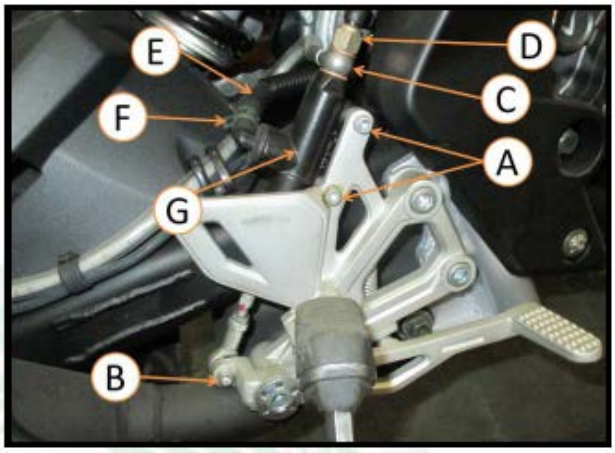
Rear brake lamp switch sensor [D],

Brake hose [B],

Rear Brake Master Cylinder [G]

•Slide out the clamp [F].

•Pull out the lower end of the oil cup hose [E] and drain the brake fluid into a container.



Installing Rear Brake Master Cylinder

•Replace the gaskets on both sides of the hose joint with new ones.

•Install:

The operations should be conducted in reverse order of disassembly.

•Locking torque:

Locking Torque of Rear Brake Master Cylinder Mounting bolt: 25 N•m

Locking Torque of Rear Brake Lamp Switch Sensor: 25 N•m

•Exhaust air from the brake pipe (see “Air Bleeding in the Brake Pipe”).

•Check whether the braking performance of the brakes is normal and the brake fluid leaks.

Disassembling Front Brake Master Cylinder

•See “Regular Maintenance” —“Replacing Rubber Parts of Brake Master Cylinder”.

Disassembling Rear Brake Master Cylinder

•See “Regular Maintenance” —“Replacing Rubber Parts of Brake Master Cylinder”.

Assembling Brake Master Cylinder

•See “Regular Maintenance” —“Replacing Rubber Parts of Brake Master Cylinder”.

Checking Brake Master Cylinder (Visual Check)

•Disassemble the Brake Master Cylinder (see “Disassembling Front / Rear Brake Master Cylinder”).

•Disassemble the front and rear Brake Master Cylinder (see “Regular Maintenance” —“Replacing Rubber Parts of Brake Master Cylinder”).

•Check for scratches, rust or sag on the inner wall of each Brake Master Cylinder and the outer surface of each piston.

★ If there is any damage in pump or piston, please replace!

•Check main and secondary cups.

★ If the cup is worn, broken, softened (corroded) or swollen, replace the entire piston with the cup.

★ If you find the brake handle/pedal is leaking brake fluid, replace the entire piston with the cup!

•Check the dust cover for damage.

•If the dust cover is damaged, replace it!

•Check whether the piston return spring is damaged.

★ If the return spring is damaged, replace it!

•Check whether the oil outlet hole and the oil inlet hole are blocked.

★If the oil outlet hole is blocked, the Brake Pads will produce resistance to the brake disc. Clean the outlet hole with compressed air.

Brake Discs

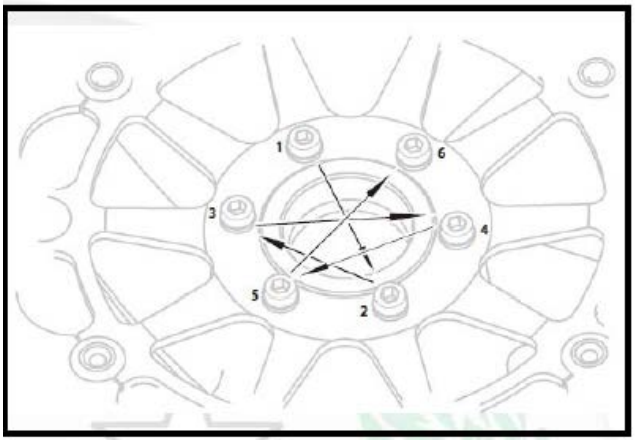
Disassembling Brake Discs

•Disassemble the wheels (see “Wheels / Tires”—“Removing Front Wheels / Rear Wheels”).

•Disassemble mounting bolts and remove the brake disc.

○Disassemble the sensor rotor (models equipped with ABS).

•Disassemble the gasket.



Installing Brake Disc

•Replace the gasket.

•Install the brake disc onto the wheels with the marked side facing out.

○Install the sensor rotor to the brake disc with the marked side [A] facing out (models equipped with ABS).

•Apply thread tightening glue to the threads of front brake disc and rear brake disc mounting bolts.

•Tighten the bolts onto the brake disc step by step in a crossed pattern.

•Locking torque:

Locking Torque of Brake Disc Mounting bolt: 22 N•m

Checking the Wear of Brake Disc

•Measure the thickness of the brake disc in the most severe wear of each brake disc.

★ If the brake disc wear exceeds the lower Service Limit, please replace!

Thickness of brake disc

Standards:

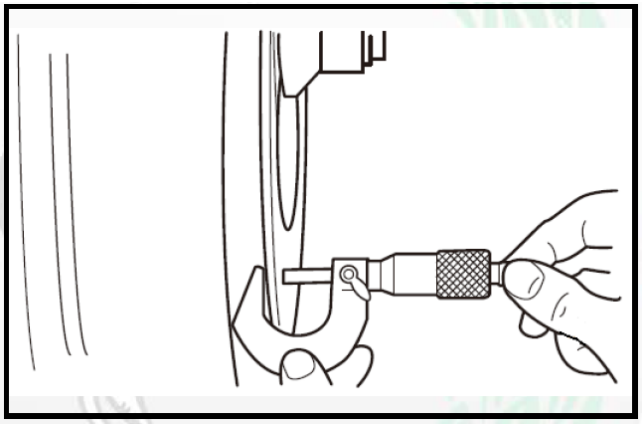
Front brake disc 4.8 -5.0 mm

Rear brake disc 3.8 -4.0 m

Lower Service Limit:

Front brake disc 4.5 mm

Rear brake disc 3.5 mm



Checking the Deformation of Brake Disc

•Lift the front wheel / rear wheel from the ground.

○In order to facilitate the inspection of the front brake disc, the handlebar can be completely inverted to one side.

•Turn the [B] wheel by hands and place the dial indicator on the brake disc [A] (see figure below)

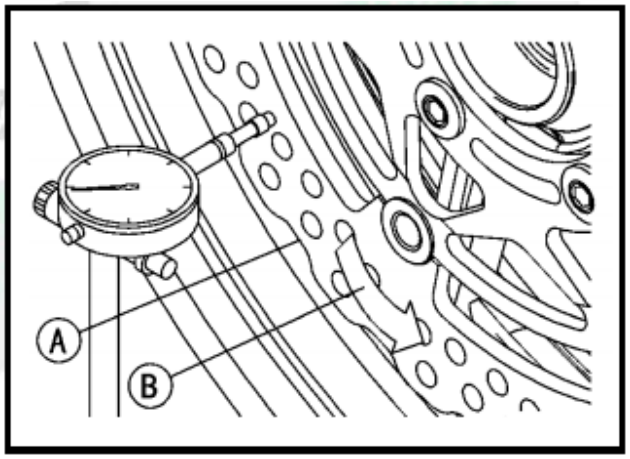
), to measure the runout of brake disc.

★If the runout of brake disc exceeds the upper Service Limit, please replace the brake disc!

Runout of brake disc

Standard: ≤TIR 0.15 mm

Upper Service Limit: TIR 0.3 mm



Brake Fluid

Checking the Level of Brake Fluid

•See “Regular Maintenance”—“Checking the Level of Brake Fluid”.

Replace Brake Fluid

•See “Regular Maintenance”—“Replacing Brake Fluid”.

Air Bleeding from Brake Pipe

Brake fluid compression coefficient is very small, so almost all the work of the brake handle/pedal or brake pedal will be transmitted directly to the calipers, thus generating braking effect. But the air is easily compressed. If the air enters the brake pipe, part of the work of brake handle/pedal or brake pedal will be used to compress the air, thus making brake rod or brake pedal soft and reducing braking performance.

⚠Warning
After the brake fluid is changed or the brake pipe joint is released, operators feel the brake handle/pedal or the brake pedal soft, the air inside the brake pipe must be exhausted.

Remark
○*The procedures for removing air from the rear brake pipe are as follows. The procedures for exhausting the air from the front brake pipe are the same as that of the rear brake pipe.*

Order for Releasing Air

1. Remove the brake fluid cylinder cover.
2. Remove the brake fluid cylinder diaphragm.
3. Install the pipe at the front of the drain screw and prepare the oil pan at the front end of the pipe.
4. First brake several times, in the state of grasping the brake handle/pedal, loosen the oil drain screw by about 1/2 turn, and then re-tighten it again fast.
5. Repeat the above procedures until the drain screw drains completely bubbles.
6. Reinstall the brake fluid cylinder diaphragm
7. Reinstall the brake fluid cylinder cover

Remark
○*Check the level of the brake fluid frequently during air discharge, and supplement it as necessary. If the brake fluid in oil cup completely uses up in the process of Air Bleeding, exhaust operations should be conducted again, because air may have entered the brake pipe.* ○*To discharge air more thoroughly, please tap the brake hose between the calipers and the oil cup.*

⚠Warning

The following precautions should be taken when handling disc brakes:

1. Do not reuse the brake fluid!
2. If the container containing of the brake fluid is not sealed or opened for a long time, do not use the brake fluid inside the container!
3. Do not mix different types or brands of brake fluid, or the boiling point of the brake fluid will be reduced, resulting in brake failure or corrosion of rubber brake parts.
4. Please do not open the lid of the oil cup for a long time, so as not to damp brake fluid.
5. Do not replace the brake fluid in rain or strong winds!
6. Except Brake Pads and brake discs, it is required to use disc brake fluid, isopropyl alcohol or ethanol to clean brake parts. Do not use other fluids to clean the parts above, because gasoline, oil or any other gasoline distillates may corrode rubber parts. If oil spills onto any part, it will be difficult to completely clean, and ultimately corrosion may be caused to the rubber parts inside the disc brake.
7. When handling Brake Padss or brake discs, prevent any brake fluid or other oils from splashing on them. If any brake fluid or other oil is applied to the Brake Padss or brake discs, please clean them with the fluid with a high flash point! Do not use any solvent that will leave oil residue! If it is unable to thoroughly clean the on the brake fluid or oil on the Brake Padss, please replace the new!
8. The brake fluid may quickly corrode the painted surface, so if any brake fluid spill, you must immediately wipe it!
9. No matter when you open the brake pipe joint or exhaust valve, **you must bleed the air in the brake pipe!**

Brake Hose

Disassembling / Installing Brake Hose and Brake Pipe

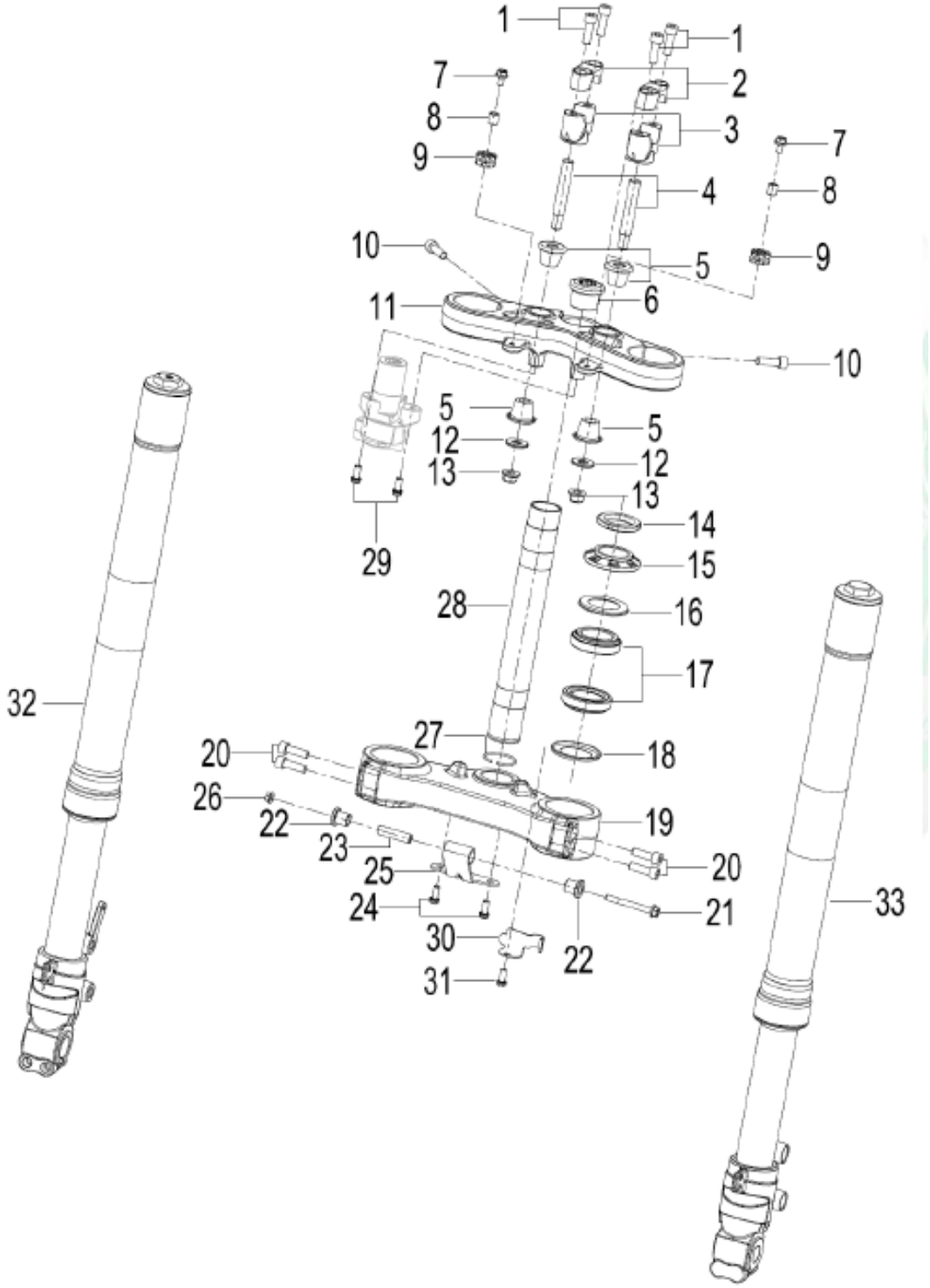
•See “Regular Maintenance”—“Replacing Brake Hose and Brake Pipe”.

Checking Brake Hose and Brake Pipe

•See “Regular Maintenance”—“Checking the Damage and Installation of Brake Hose and Brake Pipe”.

Suspension System

Front Suspension System Exploded View



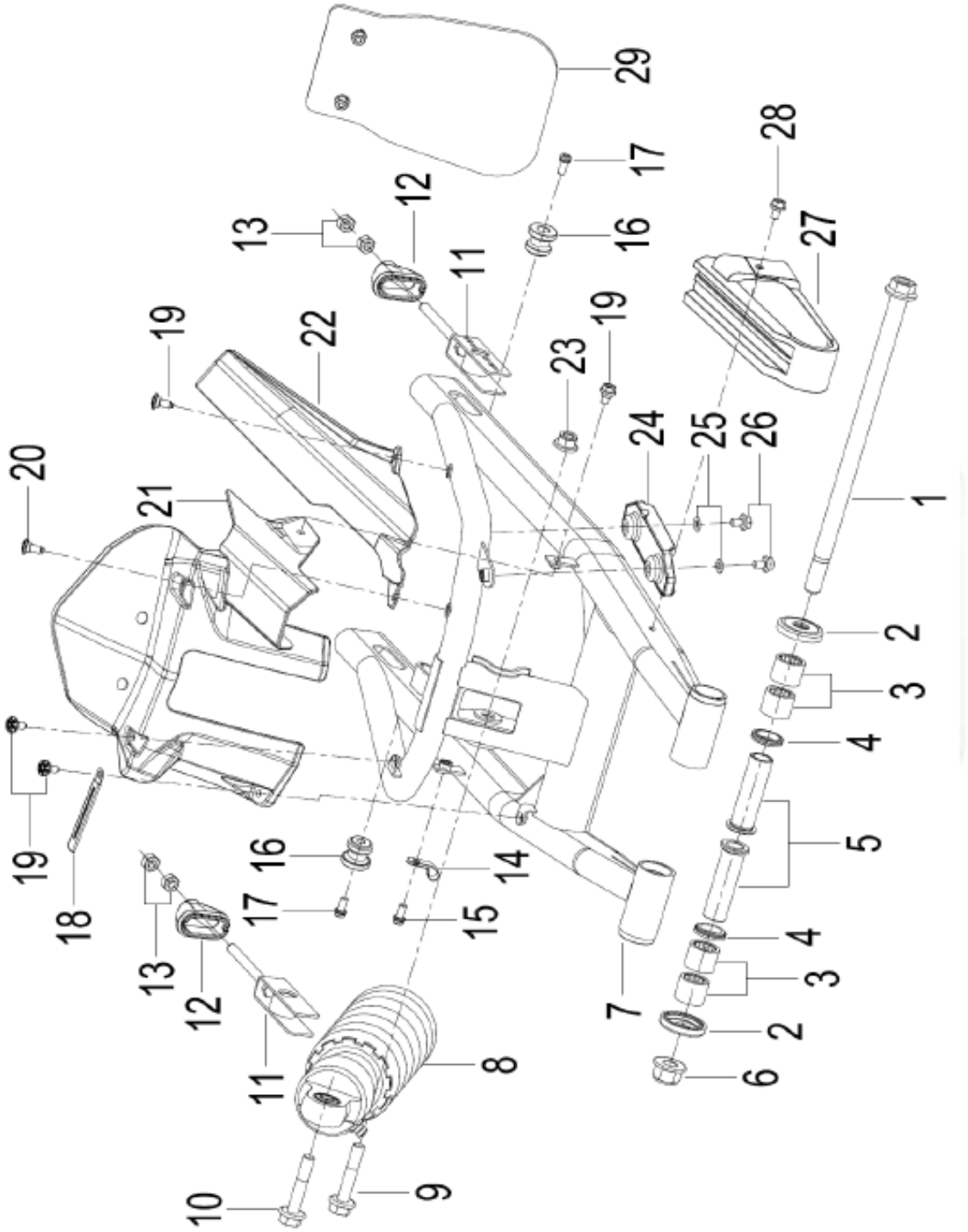
No.	Parts and specification	Torque		Remark
		N.m	Kgf.m	
1	Bolt M8×1.25×30	25	2.5	
2	Handlebar upper seat			
3	Handlebar lower seat			
4	Handle locating stud			
5	Sound reduction plug			
6	Upper bridge fastening screw	25	2.5	
7	Stainless screw M6×25	10	1.0	
8	Body Covers bush			
9	Body Covers rubber pad			
10	Bolt M8×1.25×25	25	2.5	
11	Upper bridge			
12	Handle locating spacer			
13	Self-locking nut M10×1.25	40	4.0	
14	Upper bridge fastening nut	35	3.5	
15	Special nut	24	2.4	
16	Dustproof ring			
17	Steering bearing			
18	Dustproof ring			
19	Lower link plate			
20	Bolt M8×1.25×30	25	2.5	
21	Bolt M6×60	10	1.0	
22	Head lamp cushion collar			
23	Installing spacer bush below head lamp			
24	Bolt M6×12			
25	Headlight bracket			
26	Nut M6	10	1.0	
27	Lock ring			
28	Stand column			
29	Hexagon lobular socket screw M6x20	10	1.0	
30	Right pipe clip			
31	Bolt M6x12	10	1.0	
32	Front right shock absorber component			
33	Front left shock absorber component			

G: apply grease

L: apply Loctite

R: replace parts

Rear Suspension System Exploded View



No.	Parts and specification	Torque		Remark
		N·m	kgf·m	
1	Rear swing arm installing shaft M14x1.5x280	108	10.8	
2	Dustproof ring component			G, R
3	Needle bearing HK2020			G
4	Bearing oil seal			G, R
5	Rear swing arm shaft sleeve			
6	Self-locking nut M14X1.5	108	10.8	
7	Rear swing arm assembly			
8	Rear shock absorber component			
9	Mounting bolt below rear shock absorber	45	4.5	
10	Shock absorber mounting bolt	45	4.5	
11	Chain adjuster component			
12	Chain adjuster pressure plate			
13	Nut M8	20	2.0	
14	Clutch clip			
15	Allen bolt M6x12	10	1.0	
16	Support sleeve			
17	Allen bolt M6x30	10	1.0	
18	Clip component			
19	Bolt M6x14	10	1.0	
20	Pedaling rubber installing bolt	10	1.0	
21	Rear lower fender			
22	Chain guard			
23	Self-locking nut M10X1.25	45	4.5	
24	Stop block on chain			
25	Bolt M6x10	10	1.0	
26	Gasket 6			
27	Chain guard block	S		
28	Bolt M6x12	10	1.0	
29	Front fender rubber component			

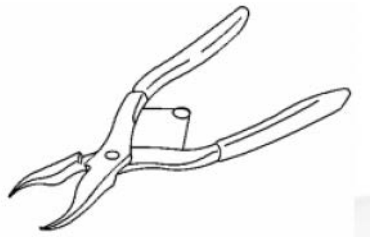
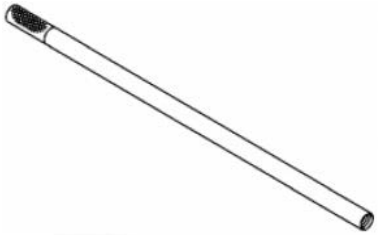
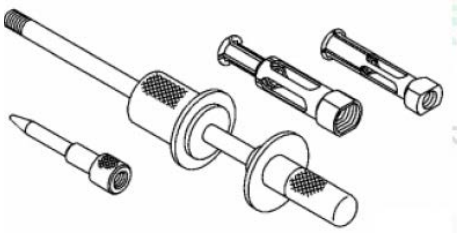
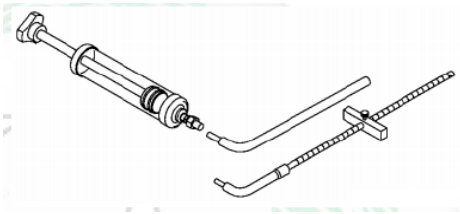
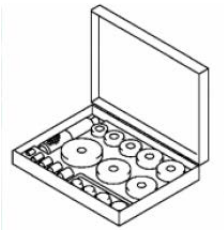
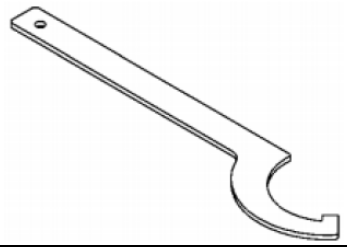
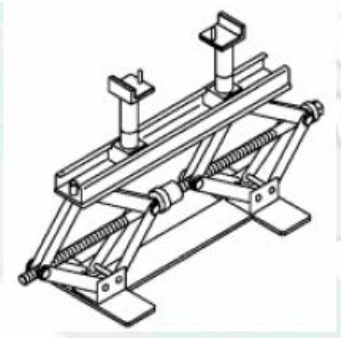
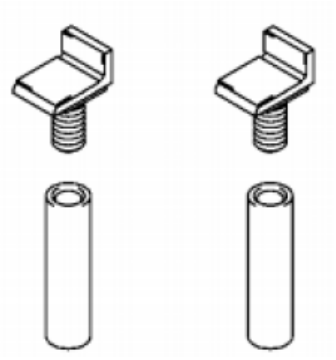
G: apply grease

R: replace parts

Technical Parameters

Item	Standard
Front shock absorber (each one)	
Diameter of front shock absorber inner pipe	41mm
Pressure	Atmospheric pressure (unadjustable)
Front shock absorber oil:	32# shock absorber oil
Viscosity	28.8-35.2
Oil quantity	440±5ml (after the disassembly, the oil has been drained completely)
Front shock absorber oil level	80±2ml (fully compressed, without front shock absorber spring: at the top of inner pipe)
Free length of front shock absorber spring	30 mm (lower Service Limit: 296mm)
Rear shock absorber	
Spring prepressing setting:	Double-nut adjustment
Standard	Spring length: 192mm
Applicable scope	Spring length: 200-192mm (From weak to strong)

Special Tool

Internal calipers:	Front shock absorber piston rod puller
	
Oil seal and bearing puller:	Front shock absorber oil level gauge:
	
Complete set of tools used for bearing assembly:	Hook wrench T=3.2:
	
Jack:	Jack accessories:
	

Front Shock Absorber

Disassembling Front Shock Absorber

●Removing:

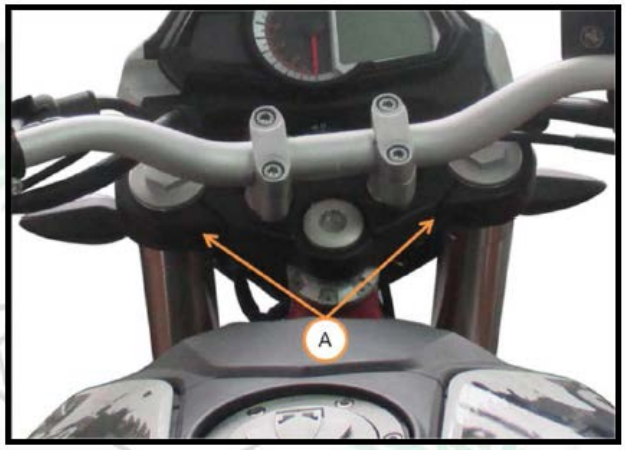
Front wheel (see “Wheel/Tire”—“Disassembling Front Wheel”),

Front fender (see “Frame”—“Disassembling Front Fender”)

Front calipers (see “Brake”—“Disassembling Front Calipers”)

★Before removing the front shock absorber installing seat, remove the upper front fork clamping bolt [A]

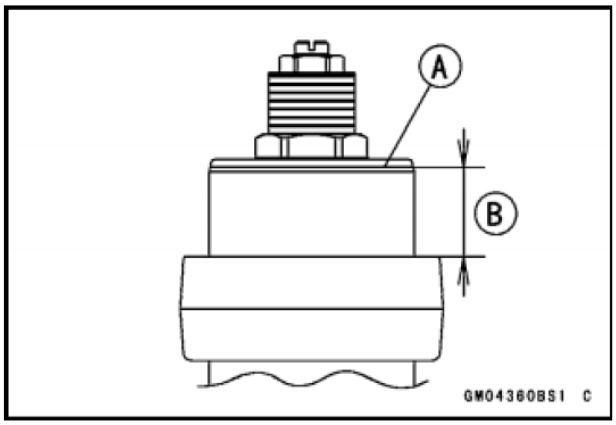
Remark
○Remove the head cover after the front fork clamping bolt is disassembled.



●Disassemble the front shock absorber clamping bolt at the upper side and front shock absorber clamping bolt [A] at the lower side.

●Turn the front shock absorber installing seat down to remove it.

Installing Front Shock Absorber



●Keep the direction and position of top of outer pipe [A] as shown in the figure on the right before installing the front shock absorber.
1 mm [B]

●Locking torque:

Front shock absorber clamping bolt (at the lower side): 22 N·m

Front shock absorber head cover: 15-20 N·m

Front shock absorber clamping bolt (at the upper side): 22 N·m

Remark
○*Lock the head cover before the front shock absorber clamping bolt at the upper side is locked.* ○*Lock two clamping bolts twice alternately to ensure that the locking torque is even.*

●Install the parts disassembled previously (see the corresponding chapters).

Replacing Front Shock Absorber Oil

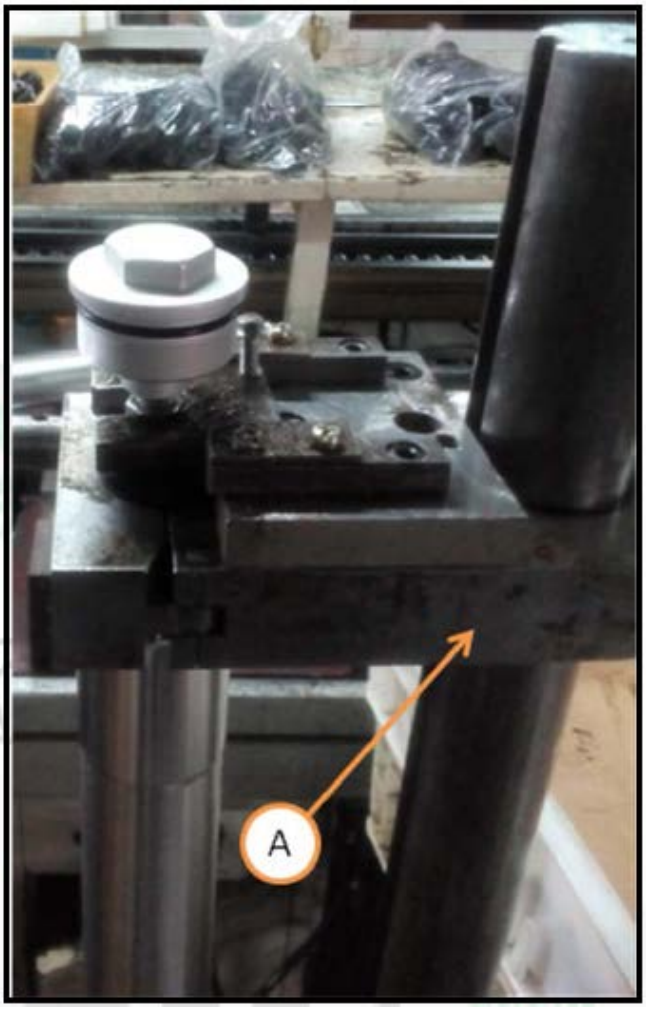
●Remove the front shock absorber (see “Disassembling Front Shock Absorber”).

●Clamp the lower end of inner pipe with a vise.

●Remove the head cover [A] from the outer pipe.

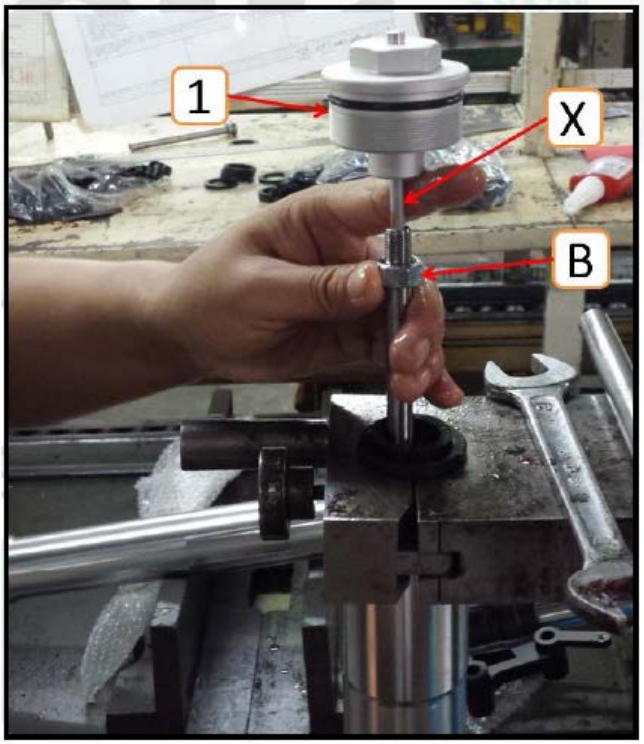
●Install the fixing tool [A], as shown in the figure.

Remark
○*The upper part protecting device shall not touch the inner pipe when installing the fixing tool; pull up the outer pipe, clamp the outer pipe with the tool, and then lock the two bolts. The outer pipe plays a guiding role.*

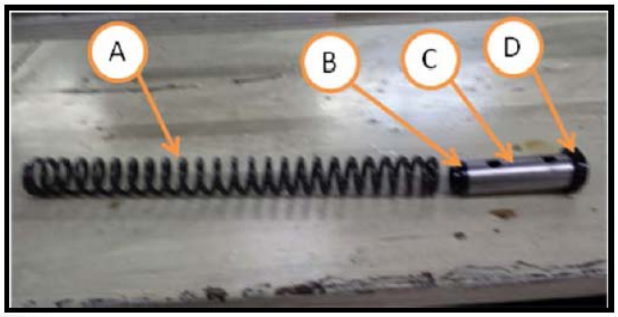


●After the spring is pressed with the special tool, disassemble the front shock absorber bolt [1] and nut [B] with a wrench,

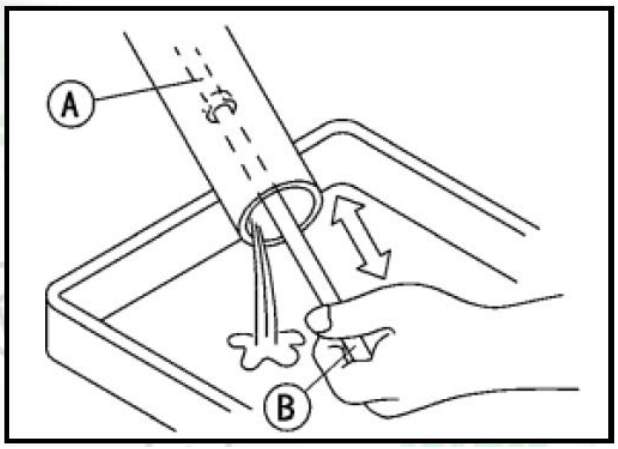
Remark
○*It is the right shock absorber, there is no adjustment lever (X) on the left shock absorber bolt and their disassembly methods are the same.*



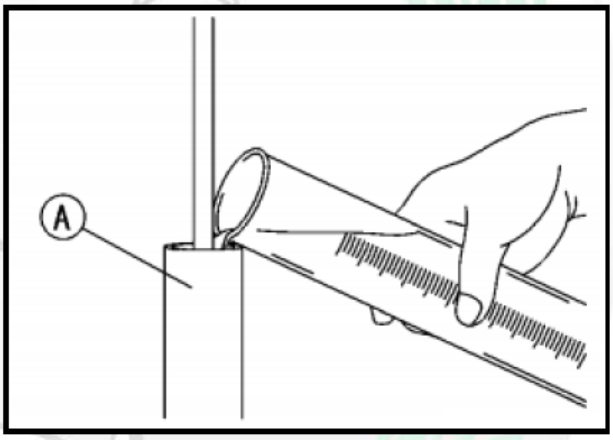
●Removing:
Shock absorber spring [A]
Spring seat [B]
Adjusting sleeve
Buffer block and adjusting sleeve seat [D]



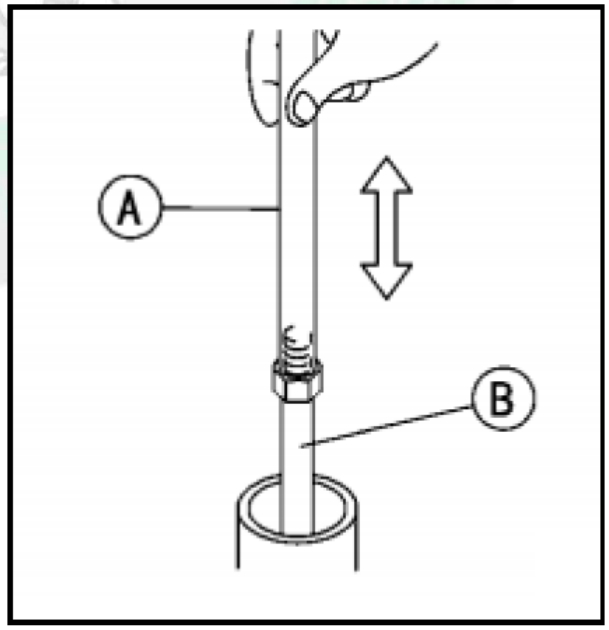
●Pour the shock absorber oil into a suitable container.
○Pull the piston rod up and down for at least ten times and pour out the shock absorber oil in the front shock absorber.
Special Tool—Shock Absorber Piston Rod Puller [B]:



●Hold the outer pipe vertically and press the inner pipe [A] and piston rod to the bottom.
●Pour the shock absorber oil of the specified model and specified quantity.
Shock Absorber Oil
Viscosity: 28.8-35.2 40℃
Oil quantity (each shock absorber): 440mL
Oil quantity when the shock absorber oil is replaced: ≈360 mL
Oil quantity after it is disassembled and dried completely: 440 ±5 mL



★If necessary, measure the oil level of shock absorber oil according to the following methods.
○It is best to use a three-jaw chuck oiling paper to wrap the inner pipe and fix it vertically.
○Pull the piston rod [B] up and down for more than ten times by using the piston rod puller [A] to drain the air in the shock absorber oil thoroughly.
Special Tool—Shock Absorber Piston Rod Puller

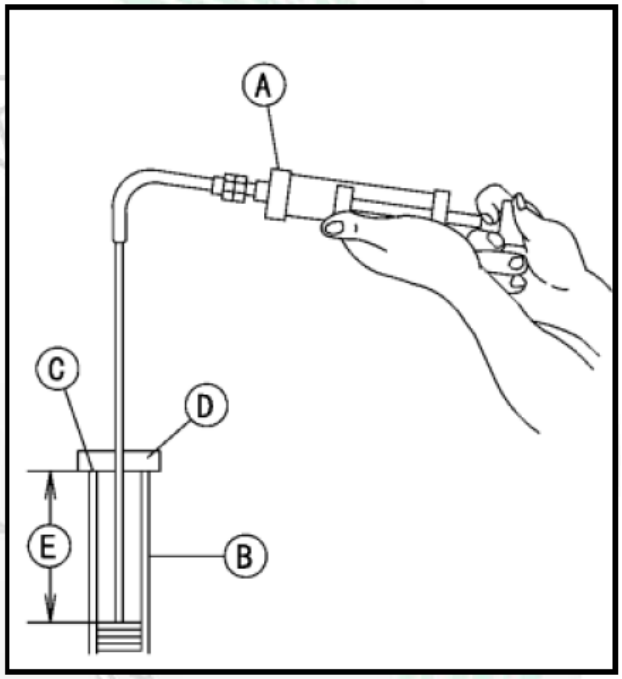


○Remove the piston rod puller.
○Wait until the oil level is stable.
○When the shock absorber is compressed to the bottom and the piston rod is pushed to the bottom, insert the tape or ruler into the inner pipe to measure the distance between the top of inner pipe and shock absorber oil level.

Oil level (when the shock absorber is compressed to the bottom and the shock absorber spring is removed)
Standard: 80±2mm
(Away from the top of inner pipe)

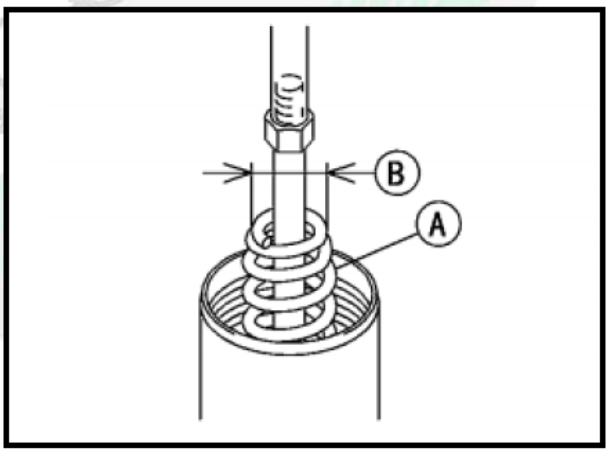
Remark
○*The shock absorber oil level can also be measured by using the shock absorber oil level gauge.*

Special Tool—Shock Absorber Oil Level Gauge [A]:
○When the shock absorber is compressed to the bottom and the shock absorber spring is removed, insert the suction pipe of shock absorber oil level pipe into the inner pipe [B] and then place the stop block at the top of inner pipe [C].
○Enable the standard oil level distance [E] to be displayed on the scale of oil level gauge stop block [D].
○Slowly pull the handle and extract the excess shock absorber oil until the shock absorber oil cannot be emitted any longer.
★If the shock absorber oil is not extracted, it indicates that the shock absorber oil in the inner pipe is insufficient. Pour the sufficient shock absorber oil and then extract the excess shock absorber oil in accordance with the above method.

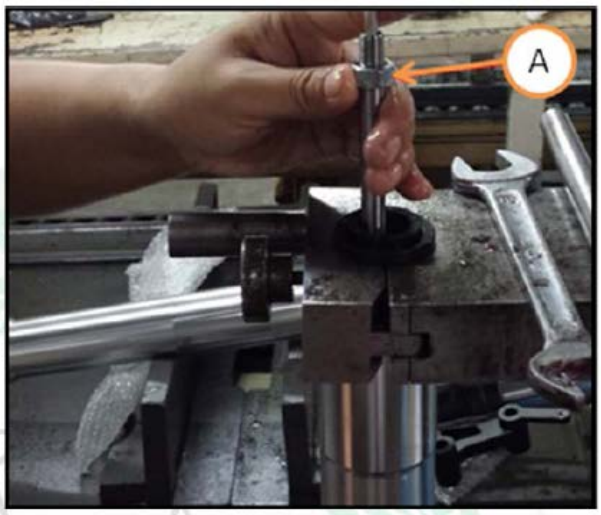


●Rotate the shock absorber piston rod puller to the end of piston rod.
Special Tool—Shock Absorber Piston Rod Puller:

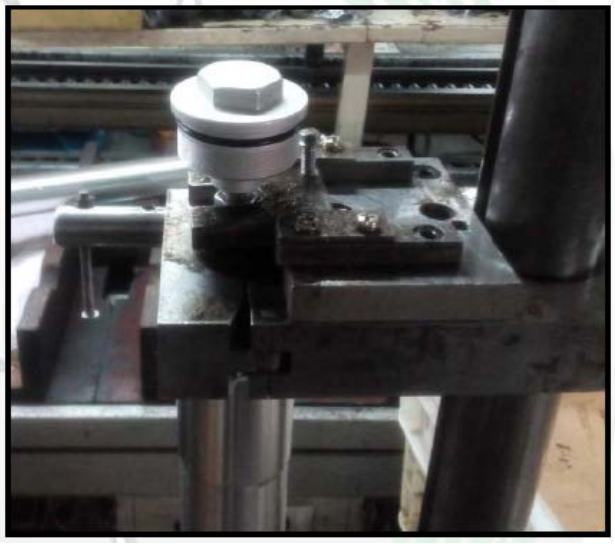
●Pull the puller above the top of outer pipe.
●Install the front shock absorber spring [A] and enable the smaller end [B] to face down.



●Installing:
Adjusting sleeve,
Buffer block and other parts
Please replace with new parts!
●Fix the bolt at the top with a wrench and lock the piston rod nut [A].
Locking torque of piston rod nut: 18-20 N·m

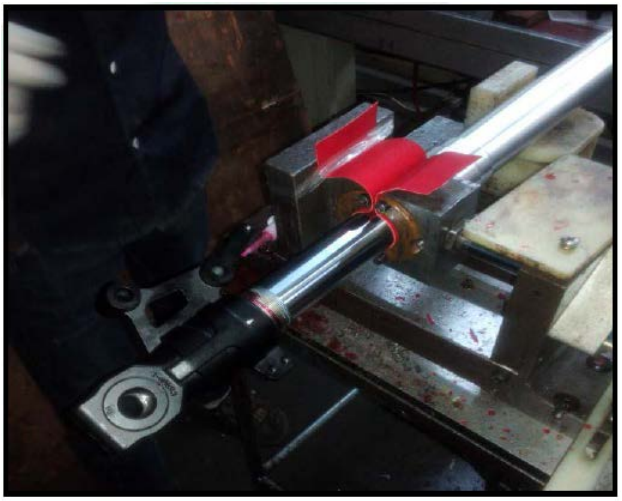


●Clamp the gasket by using the holder and loosen the front shock absorber spring compressor nut.
●Remove the front shock absorber spring compressor.
●Pull up the outer pipe and cover the outer pipe with the bolt at the top.
●Install the front shock absorber (see “Installing Front Shock Absorber”).

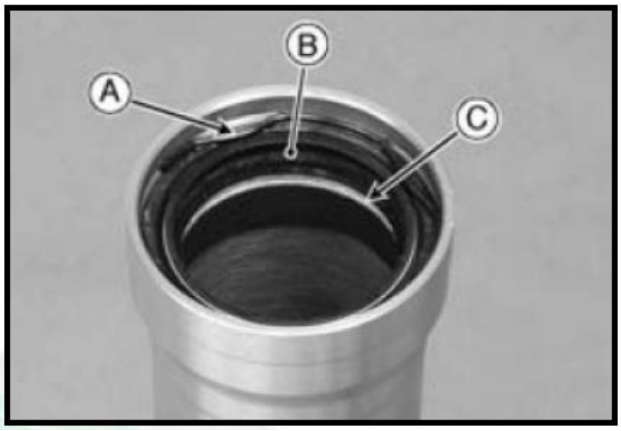


Disassembling Front Shock Absorber

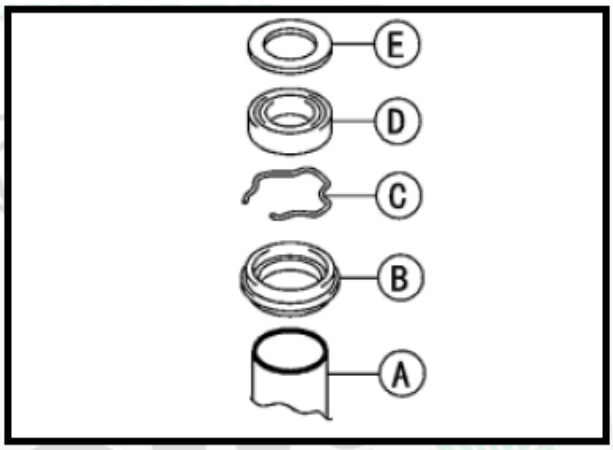
●Remove the front shock absorber (see “Disassembling Front Shock Absorber”).
●Discharge the shock absorber oil (see “Replacing Shock Absorber Oil”).
●Clamp the inner pipe of shock absorber with the tool.
●Remove the shock absorber installing seat.



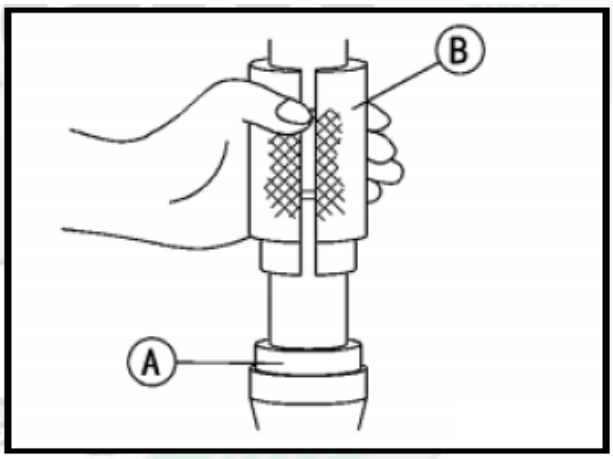
●Separate the outer pipe and inner pipe.
●Pull out the dustproof ring.
●Remove the clamp ring [A] of outer pipe.
●Remove the oil seal [B] and gasket [C].
●Replace the following parts with new ones:
Oil seal,
Locking torque of hexagon bolt at the bottom of front shock absorber: 23 N·m



●Install the following parts on the inner pipe [A].
Dustproof ring [B],
Clamp ring [C],
Oil seal [D],
Gasket [E]



●Insert the inner pipe into the outer pipe.
●After the gasket is installed, install the oil seal [A] with the shock absorber oil seal installer [B].
Special Tool—Shock Absorber Oil Seal Installer:
●Install the clamp ring and dustproof ring in the outer pipe.
●Pour the shock absorber oil of the specified type (see “Replacing Shock Absorber Oil”).
●Install the disassembled damper component on the assembled inner and outer pipes

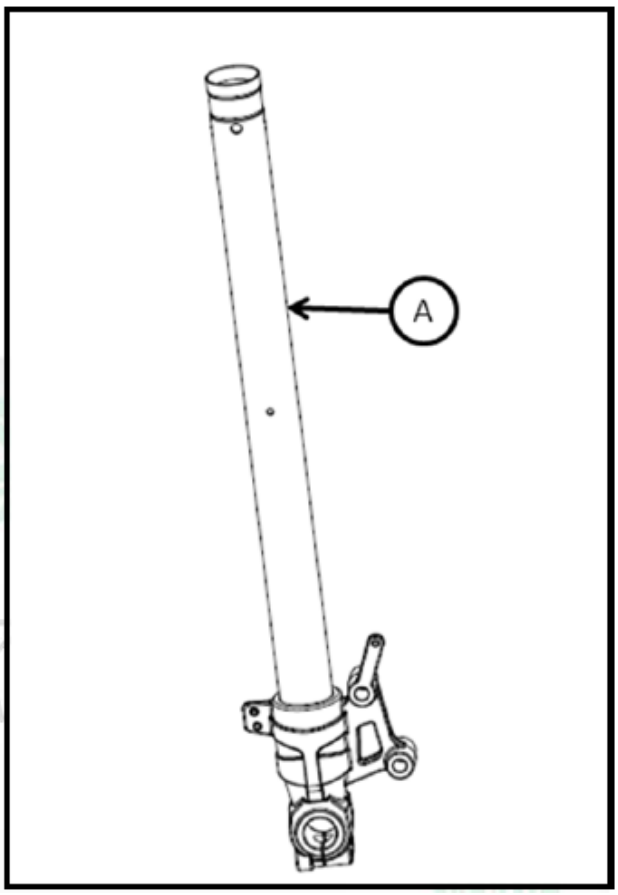


Checking Inner Pipe and Outer Pipe

●Visually check the inner pipe [A] and replace it if there is any damage.

●If there are cracks or rust on the inner pipe, the sharp edge and tilted part can be worn with a millstone. The sharp edges or raised parts will damage the oil seal.

★If the inner pipe cannot be maintained, please replace it with a new one! The oil seal will be damaged after the inner pipe is damaged, so the oil seal must be replaced when maintaining or replacing the inner pipe.



Note
If the inner pipe is severely bent or wrinkled, please replace it! The strength of inner pipe will be reduced when correcting the inner pipe after excessive bending.

●Assemble the inner and outer pipes and pull the inner and outer pipes back and forth with hands to see whether the inner pipe and outer pipe can operate smoothly.

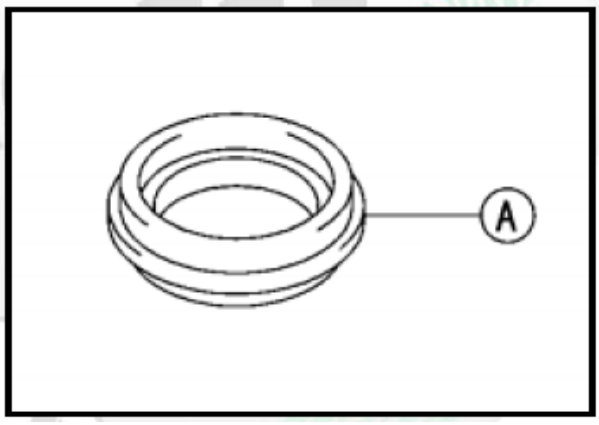
●If clamp stagnation is felt, the inner and outer pipes must be replaced.

⚠Warning
The straightened front shock absorber inner or outer pipe will break down in the using process, which will cause accidents. Therefore, the seriously bent or damaged inner or outer pipe must be replaced and the other pipe shall be checked carefully before use.

Checking Dustproof Ring

●Check whether the dustproof ring [A] is corroded or broken.

★If necessary, please replace the dustproof ring!



Checking Spring Tension

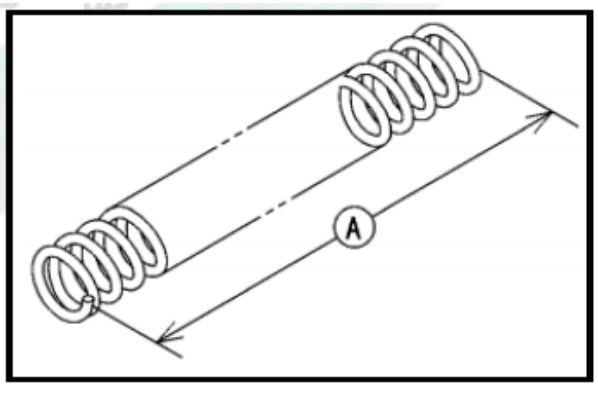
●The length of spring will be reduced after it is weakened, so the state of spring can be checked by checking its free length [A].

★If any shock absorber spring is shorter than the Service Limit, it must be replaced! If the length of new spring and the other shock absorber spring differs considerably, the other spring must be replaced at the same time so as to keep the balance of left and right shock absorbers to ensure the stability of motorcycle.

Free length of spring

Standard: 300mm

Service Limit: 296mm



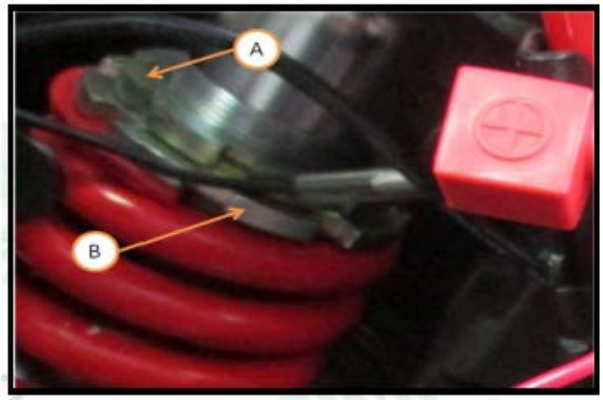
Rear Shock Absorber

Adjusting Spring Preload

●Remove the rear shock absorber from the frame (see "Disassembling Rear Shock Absorber").

●Loosen the locknut [A], rotate the adjusting nut [B] and loosen the spring.

Special Tool—Hook Wrench:



●Adjust the spring Preload, rotate the adjusting nut [B] to the suitable position and tighten the locknut [A].

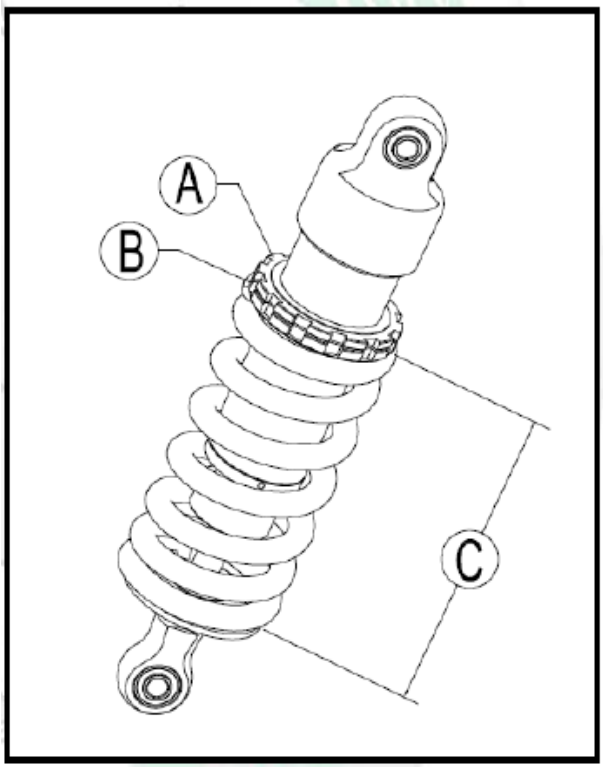
Spring length [C]

Spring Preload Setting

Standard: spring length 200mm

Applicable scope: spring length 196-184mm

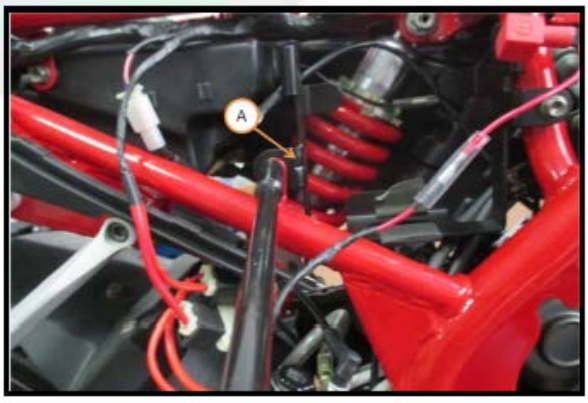
○Standard adjusting nut setting for riders with normal size [weight 68kg (150lb)] (without passengers or accessories): the spring length is 192mm.



●Right Body Covers (see "Frame"—"Disassembling Right Body Covers").

●Remove the battery (see "Charging System"—"Disassembling Battery")

●Remove the battery bracket [A] so as to rotate the hook wrench easily.

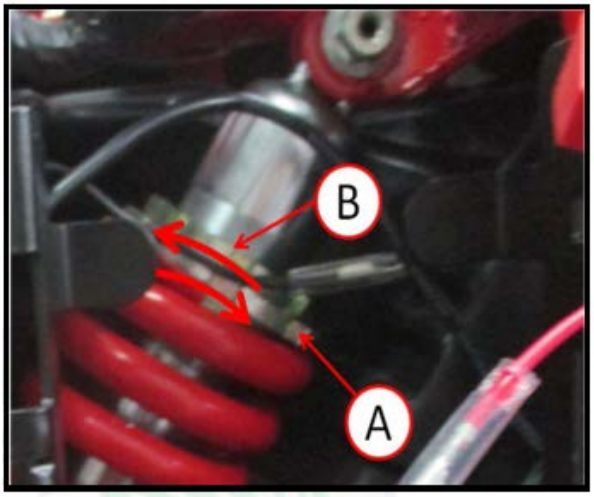


●In order to adjust the spring Preload, rotate the adjusting nut to the suitable position and tighten the locknut with a hook wrench [A] (the rear shock absorber is fixed on the frame).

Special Tool—Hook Wrench

★If you feel that the spring is too soft or hard, please adjust it!

Adjusting Spring



Spring length	Damping force	Setting	Load	Road condition	Speed
196mm	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
184mm	Strong	Hard	Heavy	Bad	High

Disassembling Rear Shock Absorber

●Removing:

Right Body Covers (see “Frame”—“Disassembling Right Body Covers”),

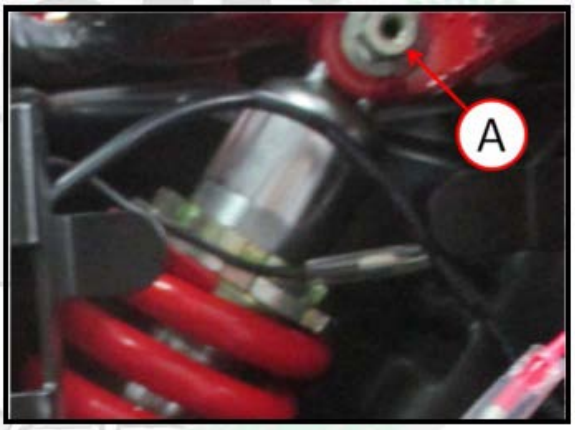
Rear lower fender (see “Rear Swing Arm”—“Disassembling Rear Lower Fender”)

●Lift the rear wheel above the ground with a jack.

Special Tool—Jack:

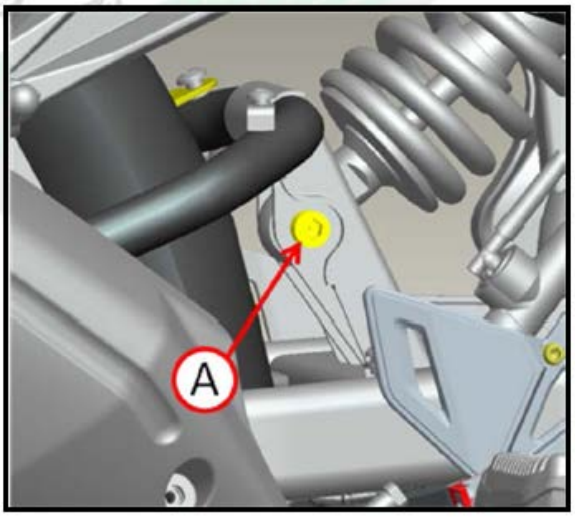
Jack Accessories:

●Remove the rear shock absorber fastening bolt [A] at the upper side



●Remove the rear shock absorber fastening bolt [A] at the lower side.

●Remove the shock absorber.



Installing Rear Shock Absorber

●Locking torque:

Fastening bolt above rear shock absorber: 45 N·m

Fastening bolt below rear shock absorber: 45 N·m

Checking Rear Shock Absorber

●Remove the rear shock absorber (see “Disassembling Rear Shock Absorber”).

●Visually checking:

Whether the travel is smooth;

Whether there is oil leakage;

Whether there is crack or dent

★If the rear shock absorber is broken, please replace it!

●Visually check the rubber bush.

★If the rubber bush is broken, please replace it!

Rear Swing Arm

Disassembling Swing Arm

●Lift the rear wheel above the ground with a jack.

Special Tool—Jack:

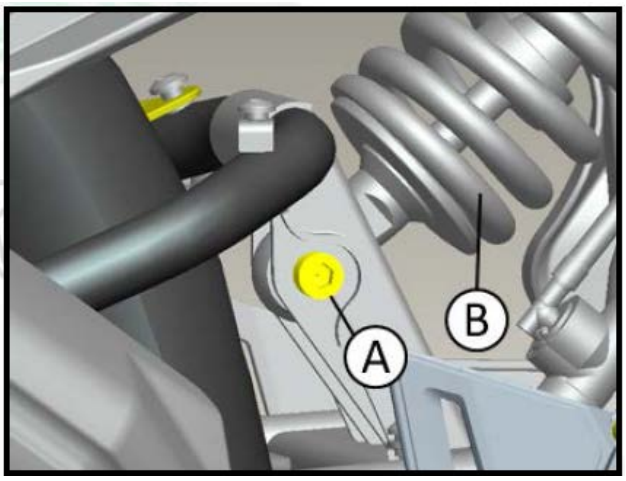
Jack Accessories:

●Removing:

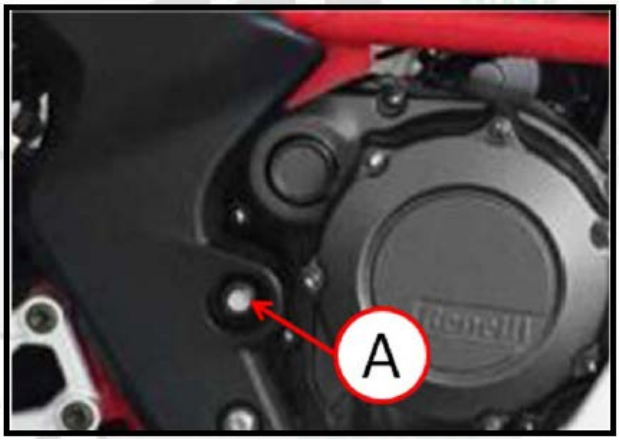
Rear wheel (see “Wheel/Tire”—“Disassembling Rear Wheel”),

●Removing:

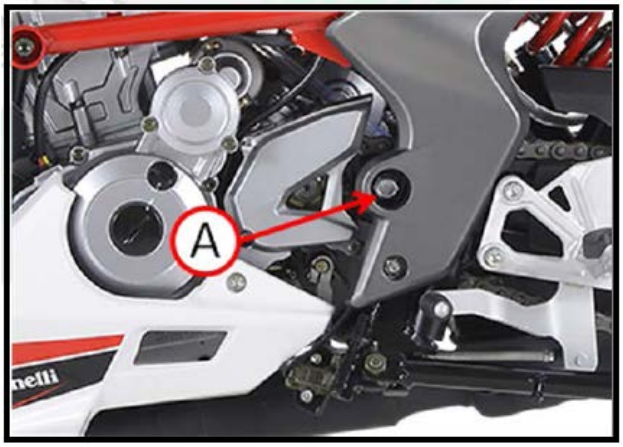
Fastening bolt [A] at the lower side of rear shock absorber [B] (see “Disassembling Rear Shock Absorber”)



●Remove the swing arm installing shaft nut [A].



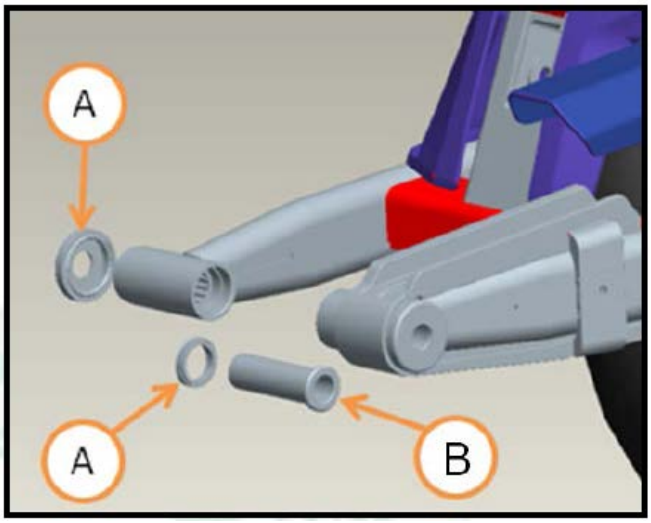
●Pull out the installing shaft [A] from the right side to the left side of motorcycle and remove the swing arm.



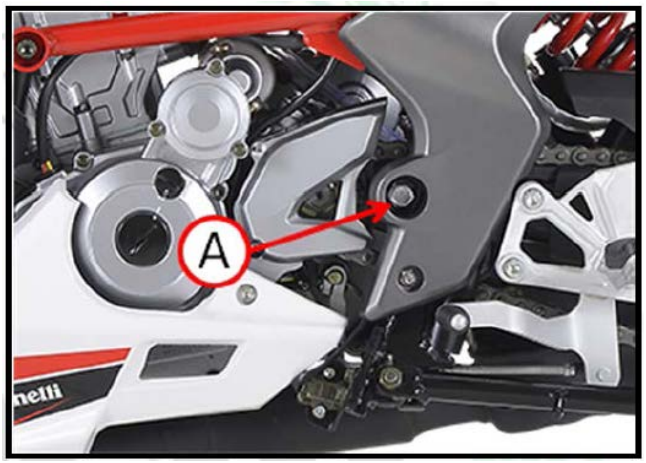
Installing Swing Arm

●Apply sufficient grease on the edge of oil seal [A].

●Install the bush [B].



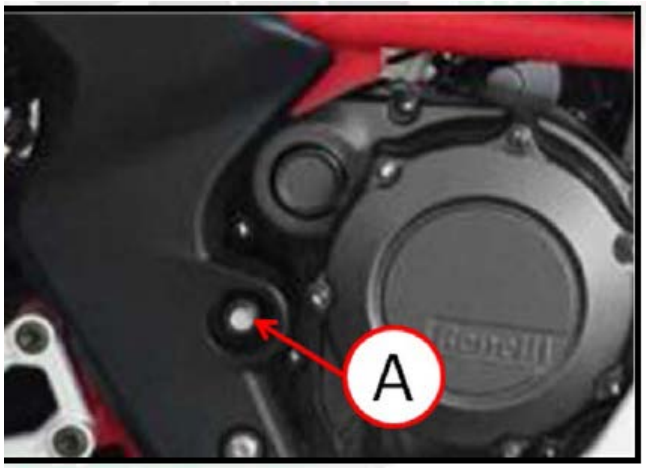
●Put the installing shaft [A] into the frame from the left side.



●Lock the swing arm installing shaft nut [A].

Locking torque of swing arm installing shaft nut: 108 N·m

●Install the parts disassembled previously (see the corresponding chapters).



Disassembling Swing Arm Bearing

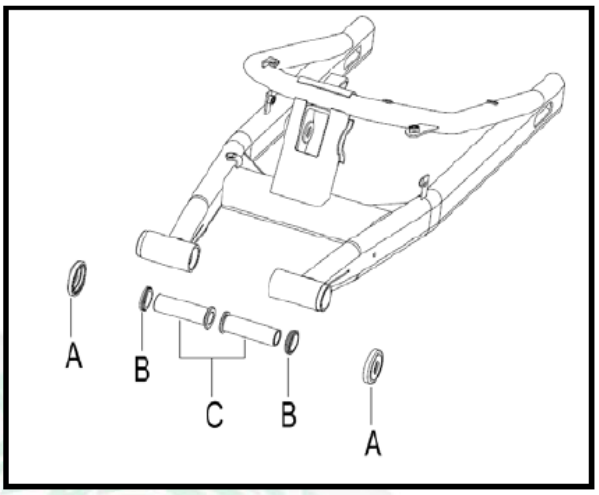
●Removing:

Rear swing arm (see “Disassembling Rear Swing Arm”),

Dustproof ring [A],

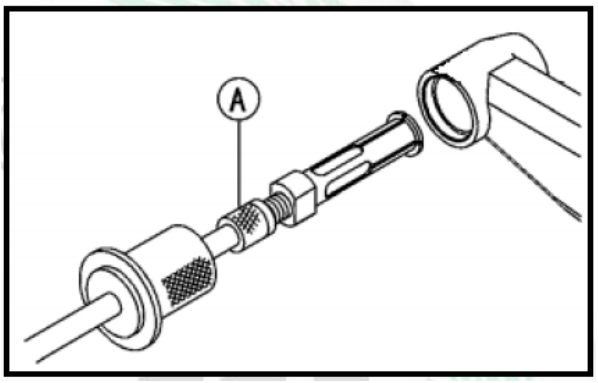
Oil seal [B],

Casing [C],



●Remove the needle bearing.

Special Tool—Oil Seal and Bearing Puller [A]:



Installing Swing Arm Bearing

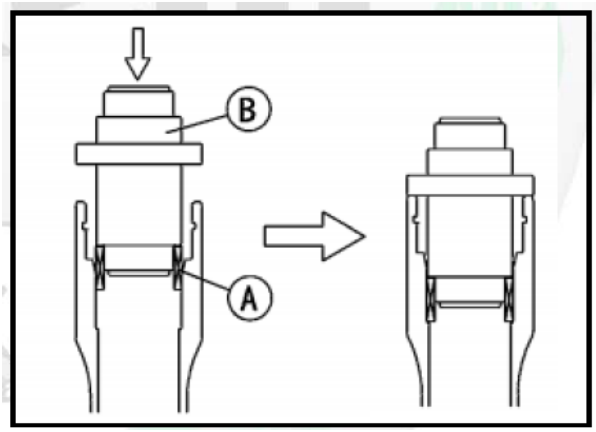
●Replace the needle bearing [A] with a new one.

●Enable the manufacturer sign to face outward when installing the needle bearing.

Special Tool—Complete Set of Tools Used for Bearing Assembly:

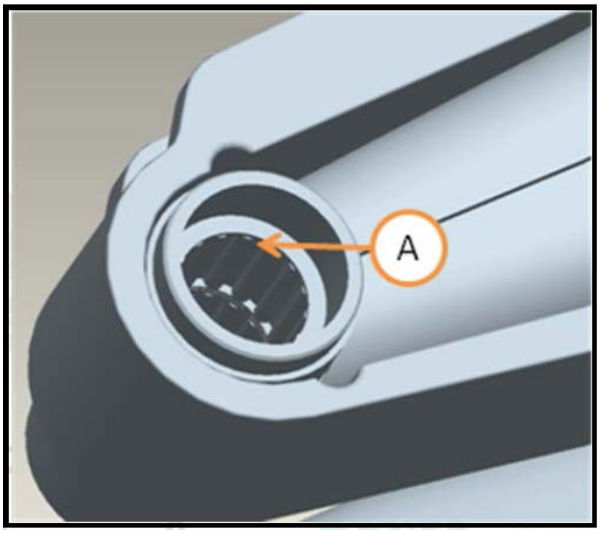
Needle Bearing Installing Tool [B]:

Gasket:



Checking Swing Arm Bearing

Note
Do not remove the bearing for check, otherwise the bearing may be damaged.



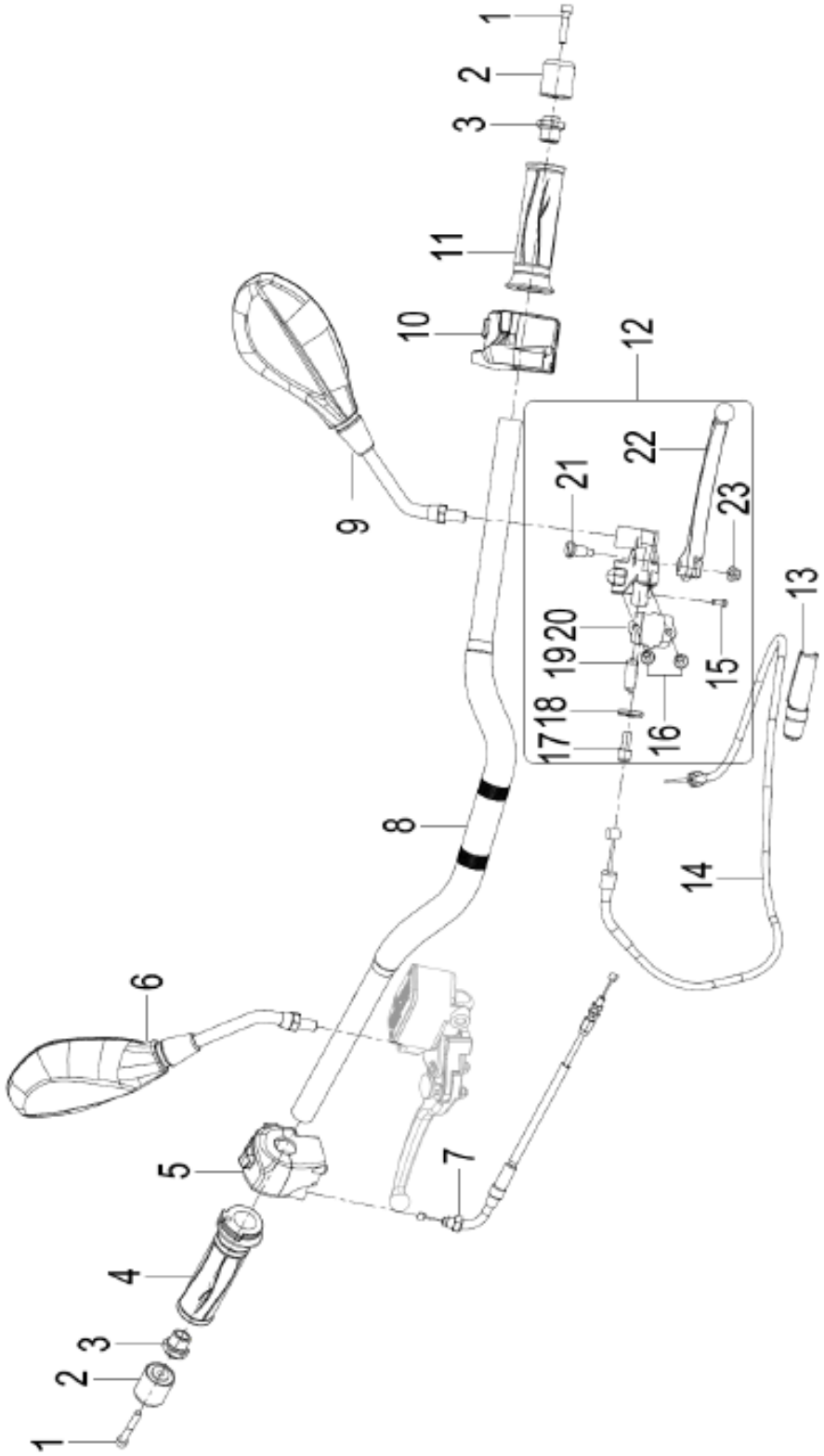
●Check the needle bearing [A] installed inside the swing arm.
○The wear of roller in bearing is small generally and it is difficult to measure the wear extent. So we can only check whether the bearing is worn or discolored or whether there are other damages visually.
★If there is any abnormal wear, discoloration or damage on the needle bearing, please carry out the overall replacement!

Checking Chain Guard

●See “Regular Maintenance”—“Checking Wear of Chain Guide”.

Steering system

Steering system Exploded View



No.	Parts and specification	Torque		Remark
		N·m	kgf·m	
1	Allen bolt M6x35	10	1.0	
2	Handlebar weight			
3	Handlebar weight installing seat	10	1.0	
4	Right grip component			
5	Right combination switch			
6	Right rearview mirror component			
7	Throttle cable component			
8	Handlebar			
9	Left rearview mirror component			
10	Left combination switch			
11	Left handlebar grip			
12	Clutch handle component			
13	Clutch cable jacket			
14	Clutch cable component			
15	Nut M6	10	10	
16	Allen bolt M5x14	6	0.6	
17	Adjusting solenoid			
18	Slotted nut			
19	Clutch switch			
20	Left handle seat base			
21	Left handle seat screw			
22	Left handle			
23	Nut M6	10	1.0	

AD: apply adhesive.

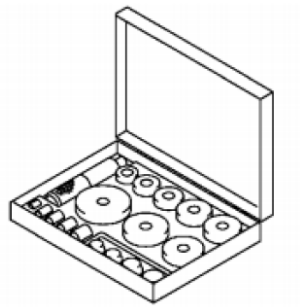
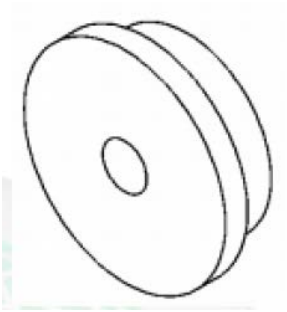
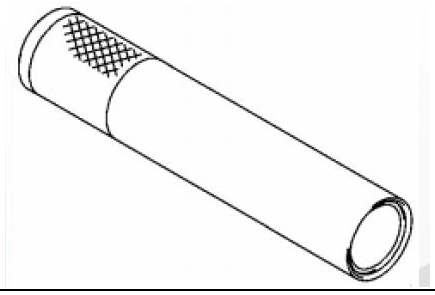
AL: lock the two fastening bolts twice alternately to ensure that the locking torque is even.

G: apply grease.

L: apply Loctite.

R: spare parts

Special Tool

Complete set of tools used for bearing assembly	Outer ring screwdriver of head pipe :
	
Steering pipe bearing installing tool (diameter: 35.5):	
	

Steering system

Checking Steering system

●See “Regular Maintenance”—“Checking Steering system Clearance”.

Adjusting Steering system

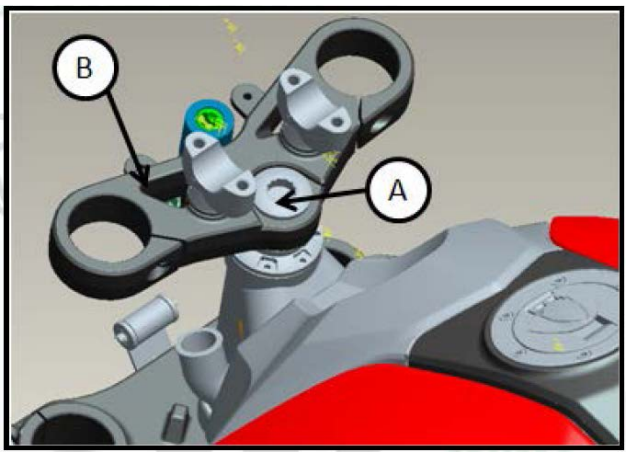
●See “Regular Maintenance”—“Adjusting Steering system Clearance”.

Steering Stem

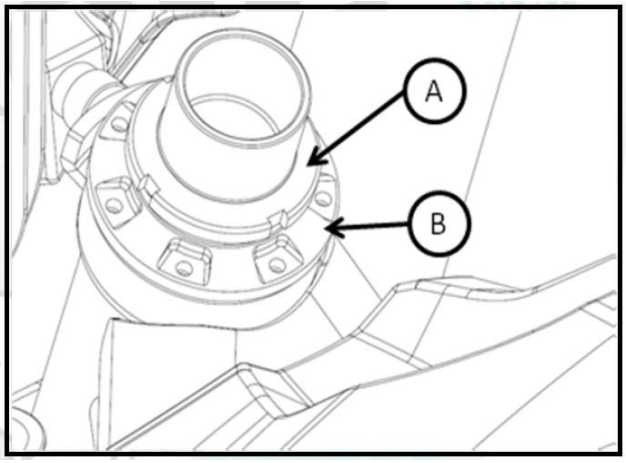
Disassembling Steering Stem and Steering Stem Bearing

●Removing:
Handlebar (see “Disassembling Handlebar”),
Fairing (see “Frame”—“Disassembling Fairing”),
Front wheel (see “Wheel/Tire”—“Disassembling Front Wheel”),
Front fender (see “Frame”—“Disassembling Front Fender”),
Front shock absorber (see “Suspension System”—“Disassembling Front Shock Absorber”),

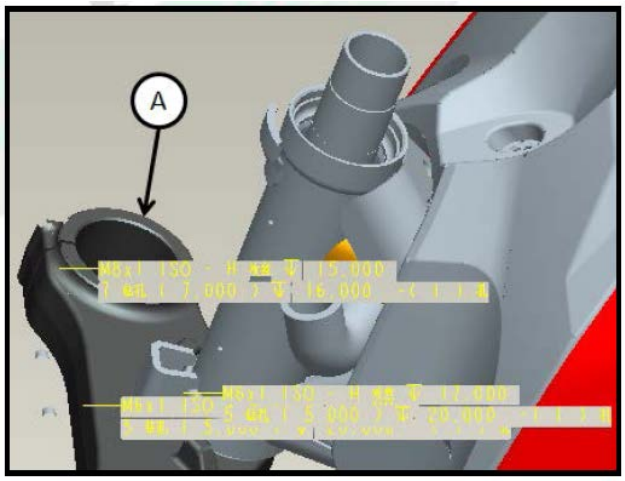
●Removing:
Upper bridge locknut [A]
Upper bridge [B],



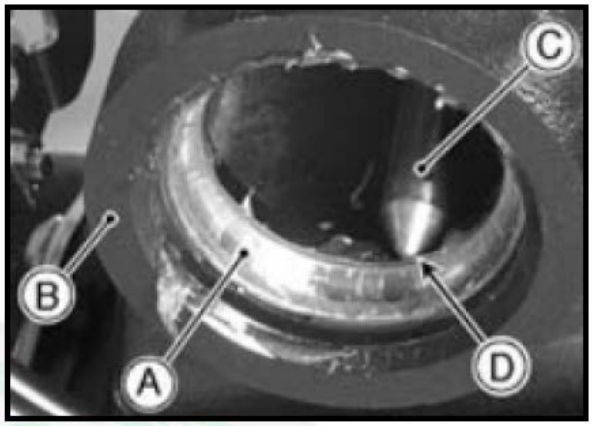
●Remove the Steering Stem locknut [A].
Special Tool—Steering Stem Nut Wrench (Four-claw):
●Remove the Steering Stem nut [B].
Special Tool—Steering Stem Nut Wrench (Seven-claw):



●Removing:
Steering Stem [A],
Ball bearing inner ring and ball bearing at the upper side

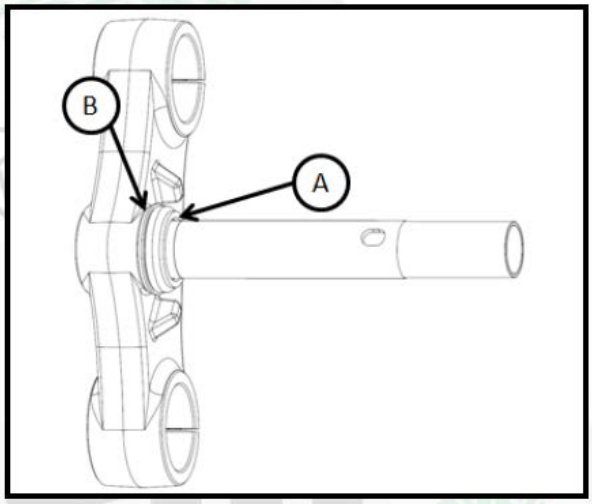


●To remove the ball bearing outer ring [A] which is pressed into the head pipe, insert a rod [C] into the inner cavity [D] of head pipe [B], and then knock both sides of ball bearing alternately to remove the outer ring.



Remark
○*If any one of bearings on the upper and lower sides of Steering Stem is damaged, it is recommended to replace both bearings at the upper and lower sides (including the bearing outer ring) with new ones.*

●Remove the lower ball bearing inner ring (and oil seal of inner ring) [A] pressed on the Steering Stem at the [B] position with a chisel (it can be purchased).



Installing Steering Stem and Steering Stem Bearing

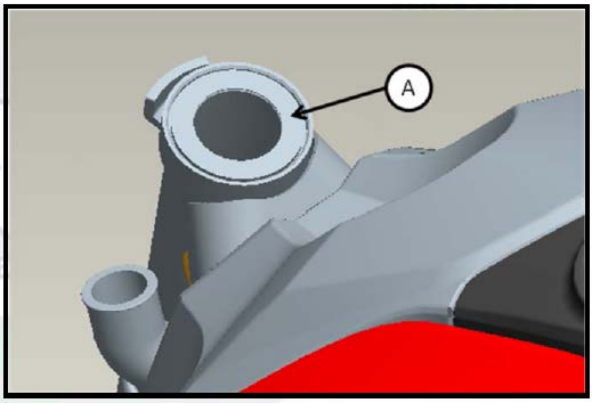
●Replace the bearing outer ring with a new one.

●Install the Steering Stem and Steering Stem bearing in the head pipe simultaneously.

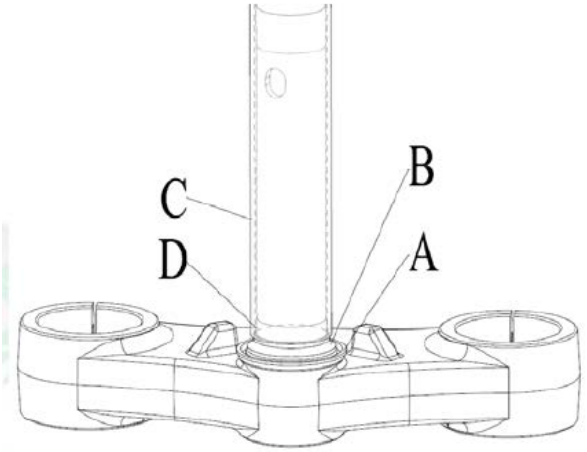
Special Tool—Special Tool for Head Pipe Outer Ring Installation [A]:

Complete Set of Tools for Bearing Assembly:

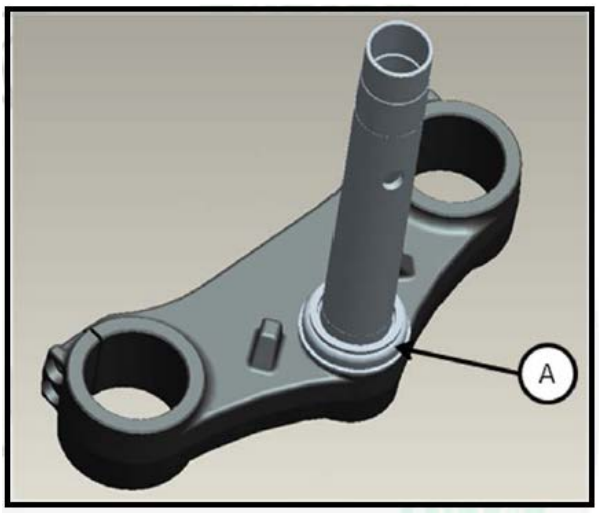
●Apply the grease to the outer ring.



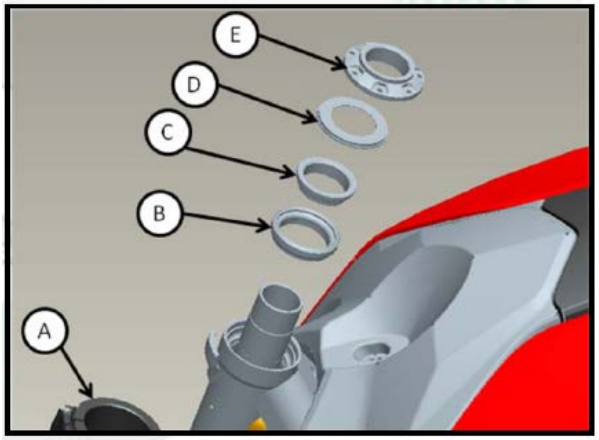
●Replace the bearing inner ring and oil seal with new ones.
●Apply grease to oil seals.
●Cover the Steering Stem with oil seal [A], then install the ball bearing inner ring at the lower side and apply grease to the Steering Stem [D].
Special Tool—Special Tool for Steering Pipe Bearing Installation [C]:



●Install the ball bearing [A] at the lower side on the Steering Stem.
●Apply grease to the following parts:
Inner and outer rings,
Ball bearings at the lower and upper sides
○The ball bearing at the lower side is the same as that at the upper side.



●Insert the Steering Stem [A] into the head pipe and then install the ball bearing [B] and inner ring [C].
●Installing:
Gasket [D]
Steering Stem nut [E

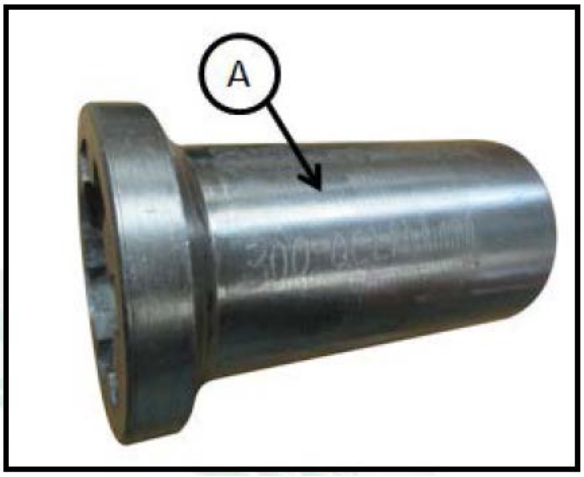


●Install the bearing at the corresponding position according to the following method.

○Lock the Steering Stem nut with a locking torque of 55 N·m first and then loosen it for a small circle (less than one circle) to enable the nut to rotate slightly. And then lock it with a Steering Stem nut wrench [A] in accordance with the specified locking torque.

Special Tool—Steering Stem Nut Wrench (Seven-claw):

Locking torque of Steering Stem nut: 23 N·m

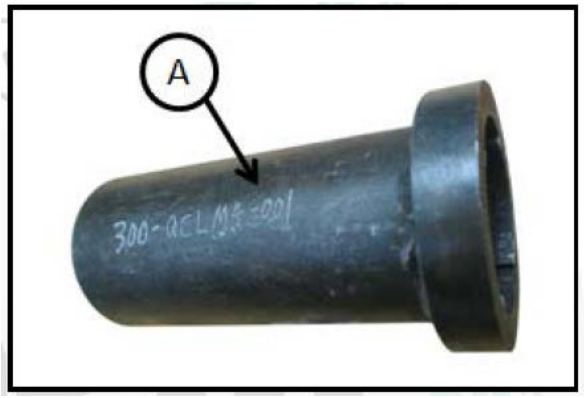


●Tighten the Steering Stem locknut manually until the locknut touches the Steering Stem nut.

●Tighten the Steering Stem locknut.

Special Tool—Steering Stem Nut Wrench (Four-claw):

Locking torque of Steering Stem nut: 23 N·m



●Install the Upper bridge and tighten the Steering Stem lock bolt.

●Install the front shock absorber (see "Suspension System"—"Installing Front Shock Absorber").

Remark
○*Lock the front shock absorber lock bolt at the upper side, then lock the Upper bridge locknut and lock the front shock absorber lock bolt at the lower side finally.* ○*Lock two front shock absorber lock bolts at the lower side twice alternately to ensure that the locking torque is even.*

Locking torque:

Front shock absorber lock bolt (at the upper side): 22 N·m

Upper bridge locknut: 78 N·m

Front shock absorber lock bolt (at the lower side): 22 N·m

⚠Warning
Please connect the cable, wire harness and hose properly (see "Appendix"—"Winding Method of Cable, Wire and Hose"), otherwise the normal rotation of handlebar will be affected.

●Install the parts disassembled previously (see the corresponding chapters).

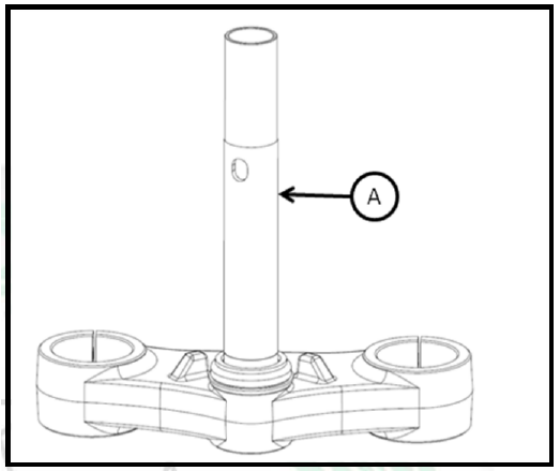
Steering Stem Bearing Lubrication

●See “Regular Maintenance”—“Steering Stem Bearing Lubrication”.

Checking Deformation of Steering Stem

●If the Steering Stem is disassembled or the Steering Stem cannot be adjusted for smooth rotation, please check the straightness of Steering Stem!

★If the Steering Stem [A] is bent, please replace it!



Handlebar

Disassembling Handlebar

●Removing:

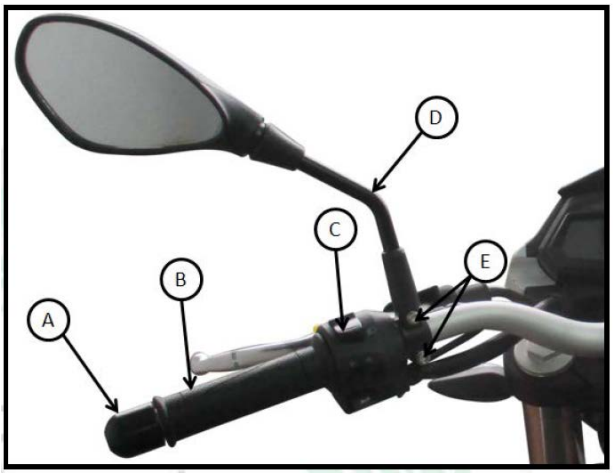
Handlebar weightHandlebar weight [A]

Left rearview mirror [D]

Clutch handle lock bolt [E],

Left combination switch [C],

Left handle grip [B],



●Removing:

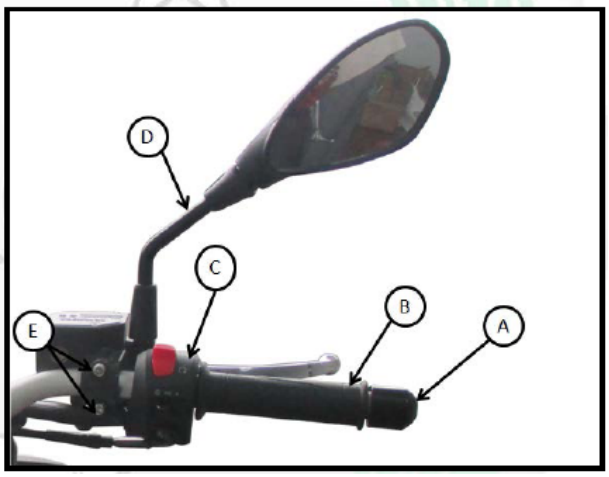
Handlebar weightHandlebar weight [A]

Right rearview mirror [D]

Front　Brake Master Cylinder lock bolt [E]

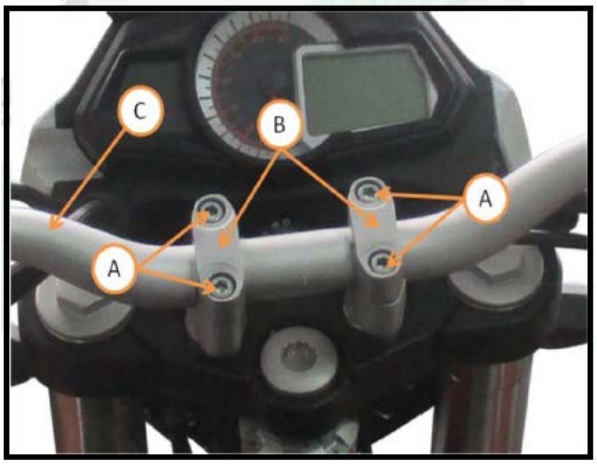
Right combination switch [C]

Throttle handle [B]

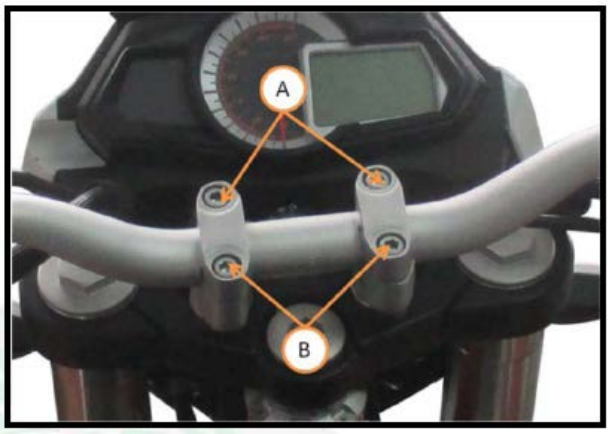


●Remove the bolt [A] of handlebar installing seat.

●Remove all the handlebar installing seats [B] and handlebars [C].



Installing Handlebar

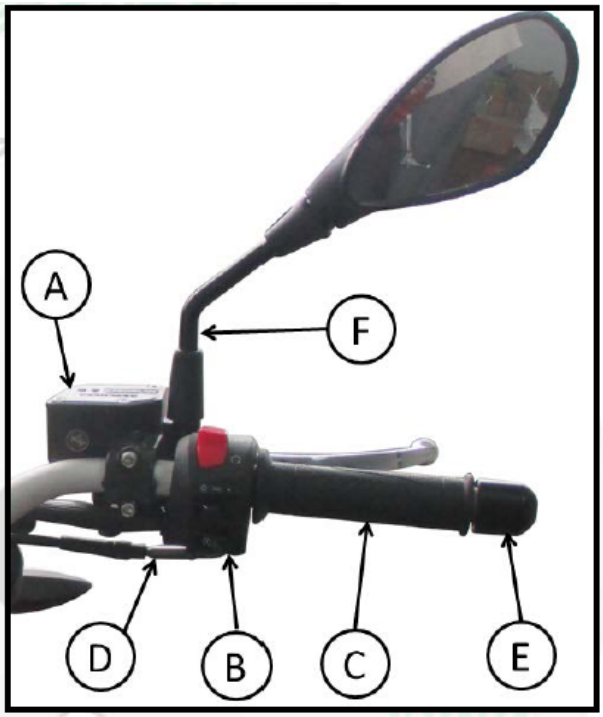


●Install the handlebar installing seat and handlebar on the Upper bridge.

●Tighten the bolt of handlebar installing seat.

Remark
○*Lock the front handlebar installing seat bolt [A] and then lock the other one [B].* ○*Lock two handlebar installing seat bolts twice alternately to ensure that the locking torque is even.*

Locking torque of handlebar installing seat bolt: 25 N·m



●Installing:

Front Brake Master Cylinder [A] (see “Brake Master Cylinder”—“Installing Front Brake Master Cylinder”))

Right combination switch [B]

Throttle handle [C]

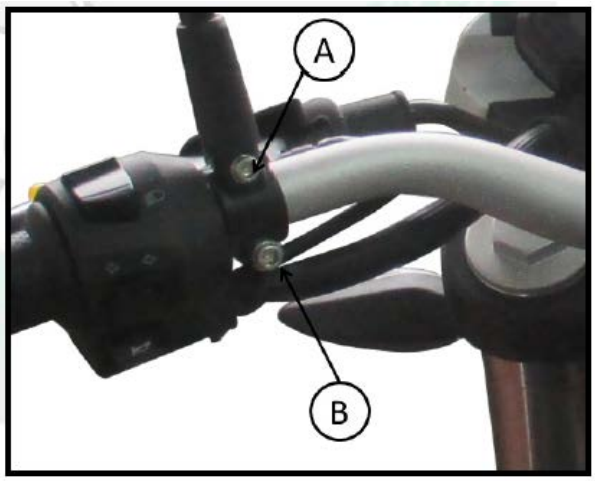
Throttle cable [D]

●Apply the Loctite to the thread of handlebar Handlebar weight bolt and then tighten the bolt.

●Installing:

Handlebar weight [E]

Right rearview mirror [F]



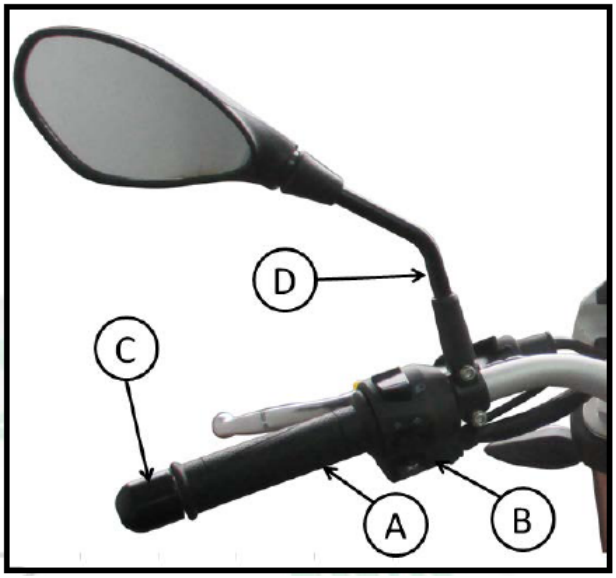
●Installing:

Clutch handle.

Remark
○*Lock the upper handlebar installing seat bolt [A] and then lock the other one [B].*

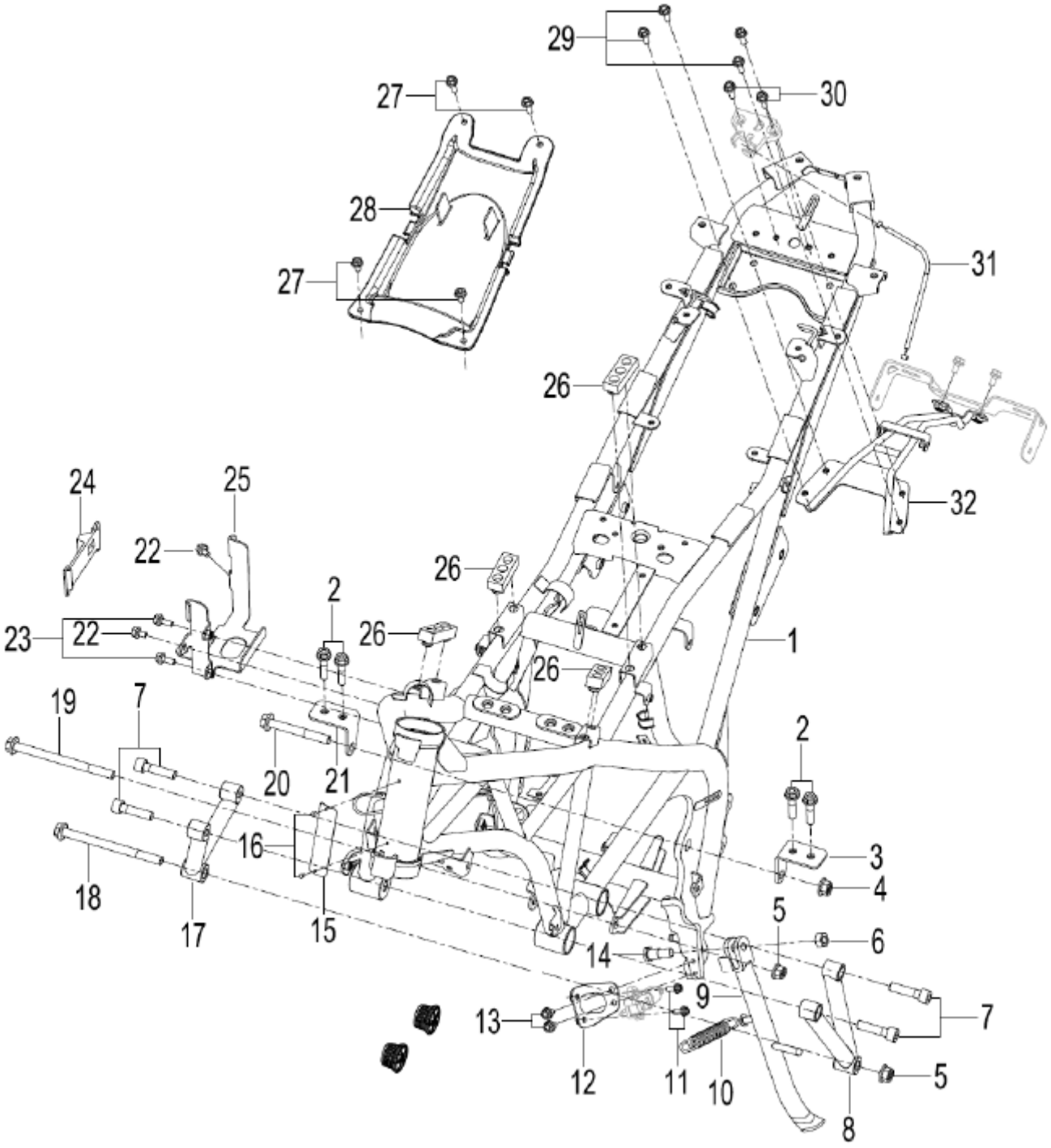
●Installing:
Left handle [A]
Left combination switch [B]
●Apply the Loctite to the thread of handlebar Handlebar weight bolt and then tighten the bolt.
●Installing:
Handlebar weight [C]
Left rearview mirror [D]

Locking torque of combination switch fastening screw: 3.5 N·m



Frame

Frame Exploded View



No.	Parts and specification	Torque		Remark
		N·m	kgf·m	
1	Frame assembly			
2	Bolt M8×35	25	2.5	S
3	Left upper hanging plate component of engine			
4	Nut M10×1.25	50	5.0	AL, S
5	Clip component			
6	Nut M10×1.25	45	4.5	
7	Allen bolt M10×40	45	4.5	S
8	Front left fixing bracket component of engine			
9	Side stand assembly			
10	Side stand spring			
11	Allen bolt M6×16	10	1.0	
12	Engine stop switch installing plate component			
13	Screw M6×10	10	1.0	
14	Side stand mounting bolt	50	5.0	
15	Frame sign			
|6	Sign rivet 3×6			
17	Front right fixing bracket component of engine			
18	Bolt M10×1.25×170	50	5.0	AL, S
19	Bolt M10×1.25×130	50	5.0	AL, S
20	Bolt M10×50	50	5.0	AL, S
21	Right upper hanging plate component of engine			
22	Bolt M6×16	10	1.0	
23	Storage battery strap component			
24	Bolt M6×12		1.0	
25	Storage battery bracket component			
26	Fuel tank installing pad			
27	Combination screw M6×16	10	1.0	
28	Tool box			
29	Bolt M6×25	10	1.0	
30	Screw M6×25	10	1.0	
31	Seat steel cable component			
32	Rear fender bracket assembly			

AL: tighten the fastening bolt twice alternately in accordance with the higher locking torque.

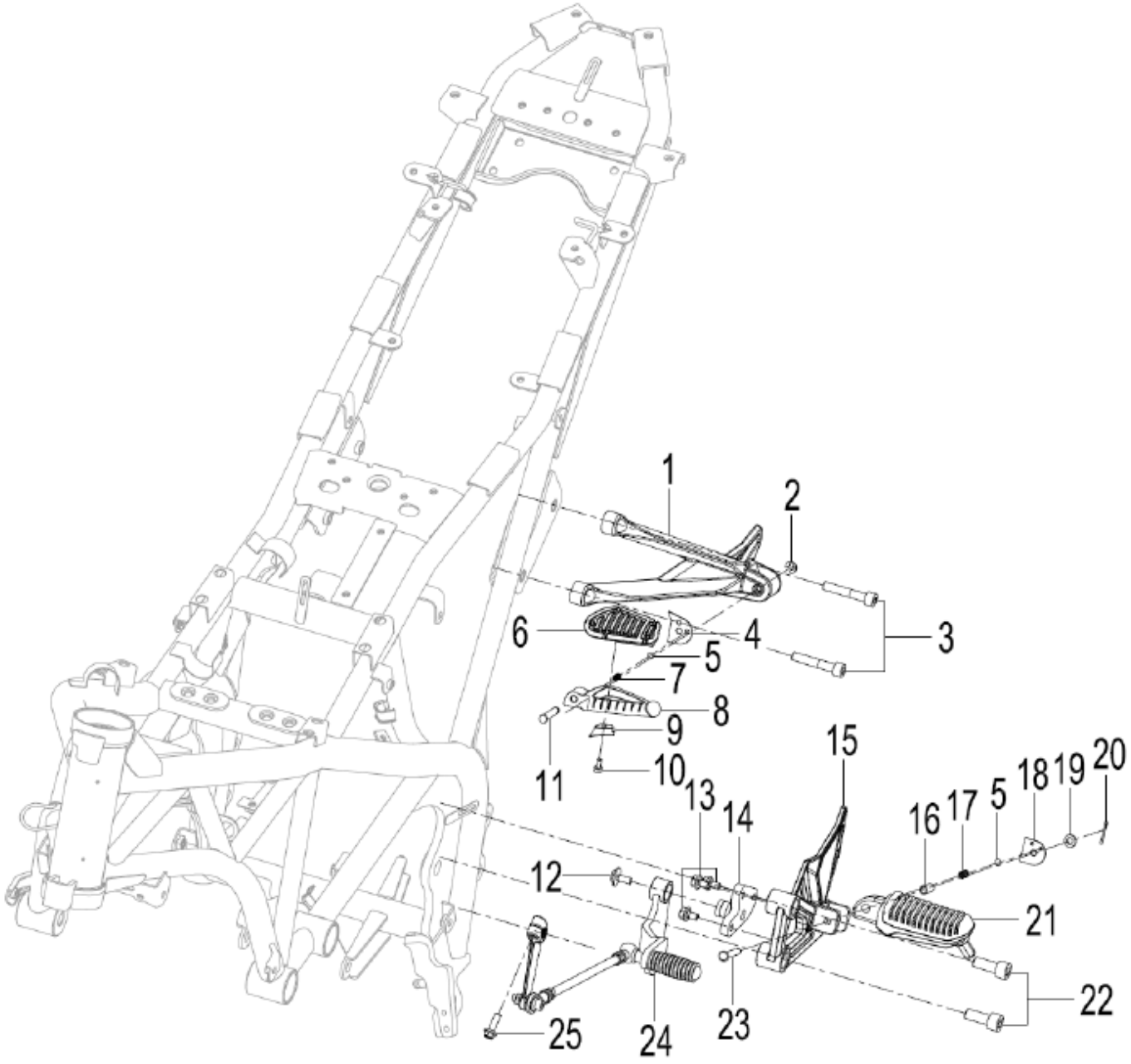
G: apply grease.

L: apply Loctite.

R: replace parts.

S: obey the specified tightening order.

Left Pedal Exploded View



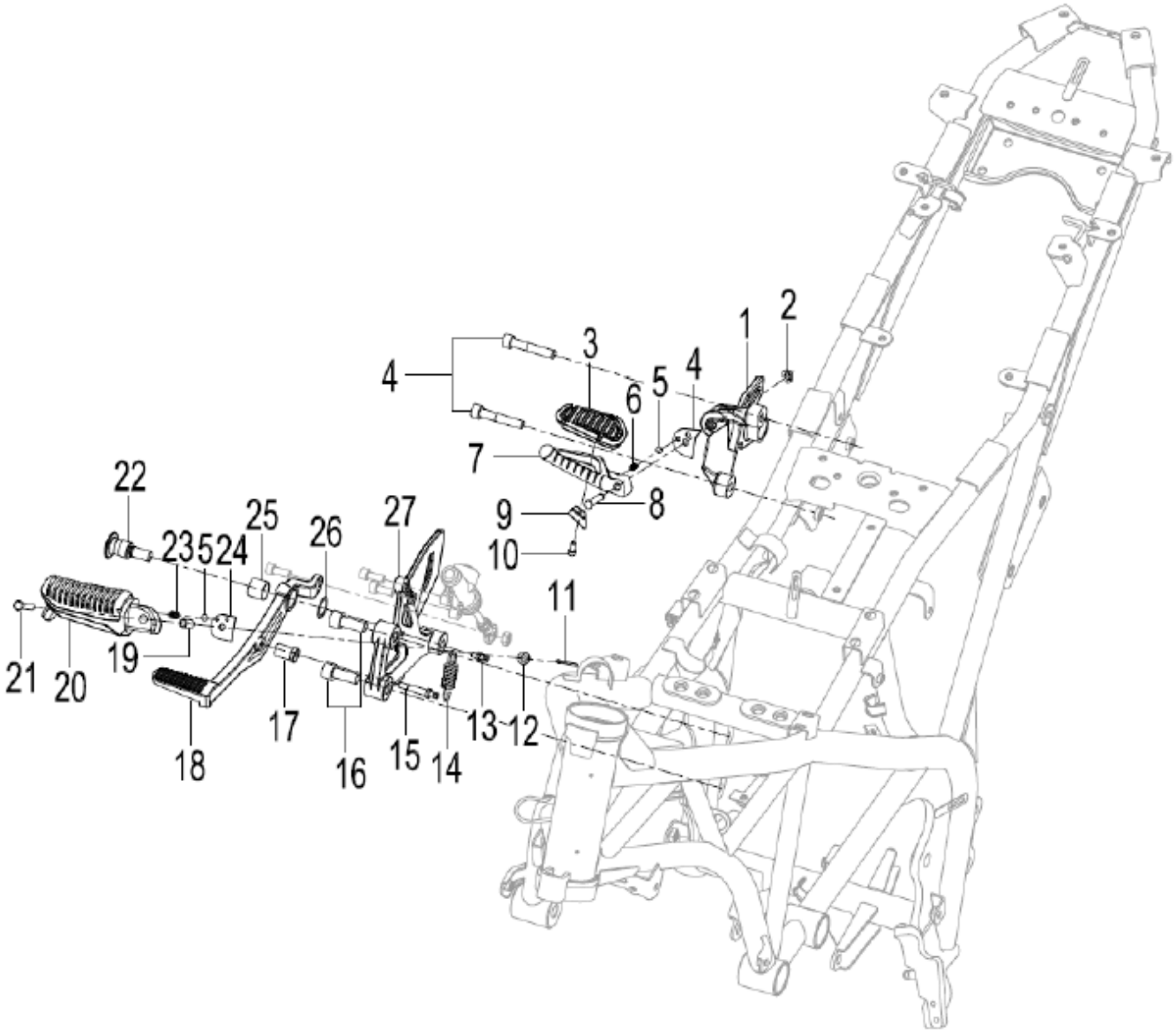
No.	Parts and specification	Torque		Remark
		N·m	kgf·m	
1	Left rear pedal bracket			
2	Check ringφ5			
3	Allen bolt M8×40	25	2.5	
4	Pedal installing plate			
5	Pedal ball			
6	Left pedal rubber			
7	Pedal spring			
8	Left rear pedal			
9	Left pedal rubber pad			
10	Screw M4×10	3	0.3	
11	Pedal installing pin			
12	Combination screw M6×10	10	1.0	
13	Bolt M6×10	10	1.0	
14	assemblyShift pedal installation bracket			
15	Left front pedal bracket			
|6	Pedal installing bush			
17	Front pedal spring			
18	Pedal installing plate			
19	Gasketφ6			
20	Cotter pin 2×18			
21	Left front pedal component			
22	Allen bolt M10×30	45	4.5	
23	Pedal installing pin			
24	Shift pedal			
25	Bolt M6×22	10	1.0	

G: apply grease.

L: apply Loctite.

R: spare parts

Right Pedal Exploded View



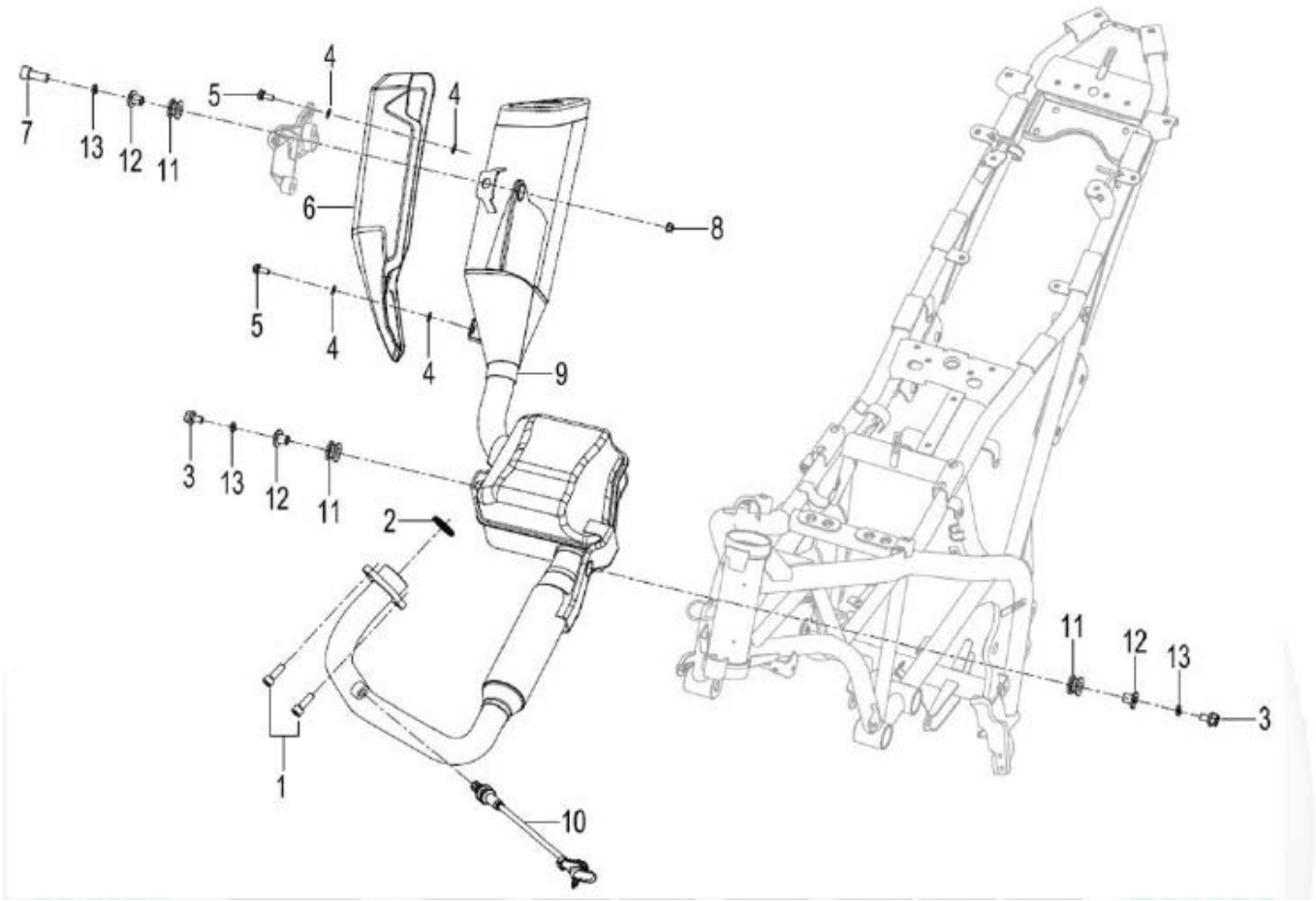
No.	Parts and specification	Torque		Remark
		N·m	kgf·m	
1	Right rear pedal bracket			
2	Check ringφ5			
3	Right pedal rubber			
4	Pedal installing plate			
5	Pedal ball			
6	Pedal spring			
7	Right rear pedal			
8	Pedal installing pin			
9	Right pedal rubber pad			
10	Screw M4×10	3	0.3	
11	Cotter pin 2×18			
12	Gasketφ6			
13	Upper spring pin	3	0.3	
14	Brake pedal reset spring			
15	Lower spring pin			
|6	Allen bolt M10×40	45	4.5	
17	Eccentric push rod	3	0.3	
18	Rear brake foot bar			
19	Pedal installing bush			
20	Right front pedal component			
21	Pedal installing pin			
22	Rear brake foot bar installing screw	22	2.2	
23	Front pedal spring			
24	Pedal installing plate			
25	Self-lubricating bush			
26	Piece			
27	Right front pedal bracket			

G: apply grease.

L: apply Loctite.

R: spare parts

Muffler Exploded View

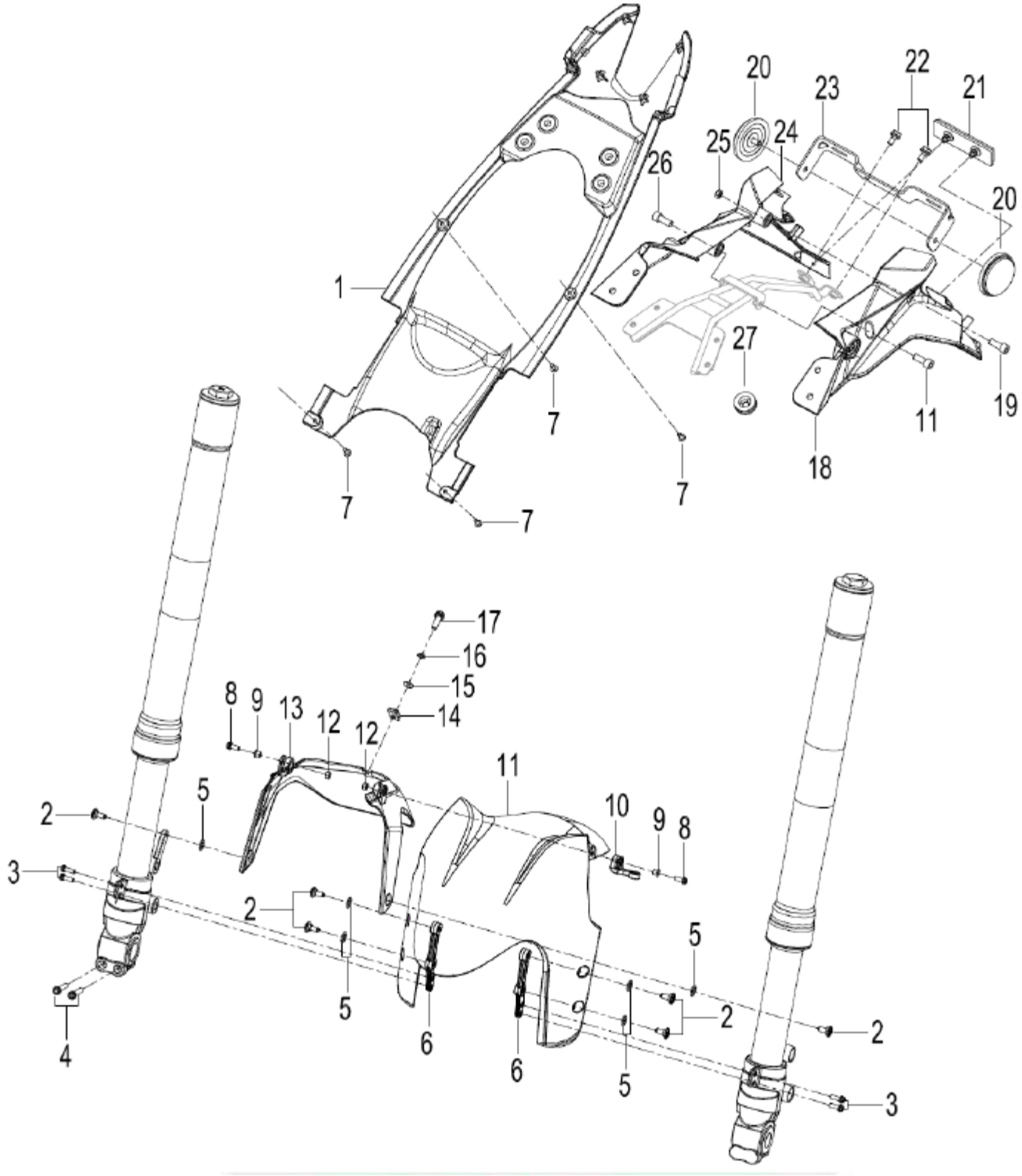


No.	Parts and specification	Torque		Remark
		N·m	kgf·m	
1	Bolt M8×16	22	2.2	
2	Exhaust pipe gasket component			
3	Bolt M8×25	22	2.2	
4	Thermal insulation spacer			
5	Combination screw M6×16			
6	Muffler decorating cover			
7	Allen bolt M8×50	22	2.2	
8	Self-locking nut M8	22	2.2	
9	Muffler assembly			
10	Oxygen sensor			
11	Spring gasket φ8			
12	Body Covers bush			
13	Rubber sleeve II			

L: apply Loctite.

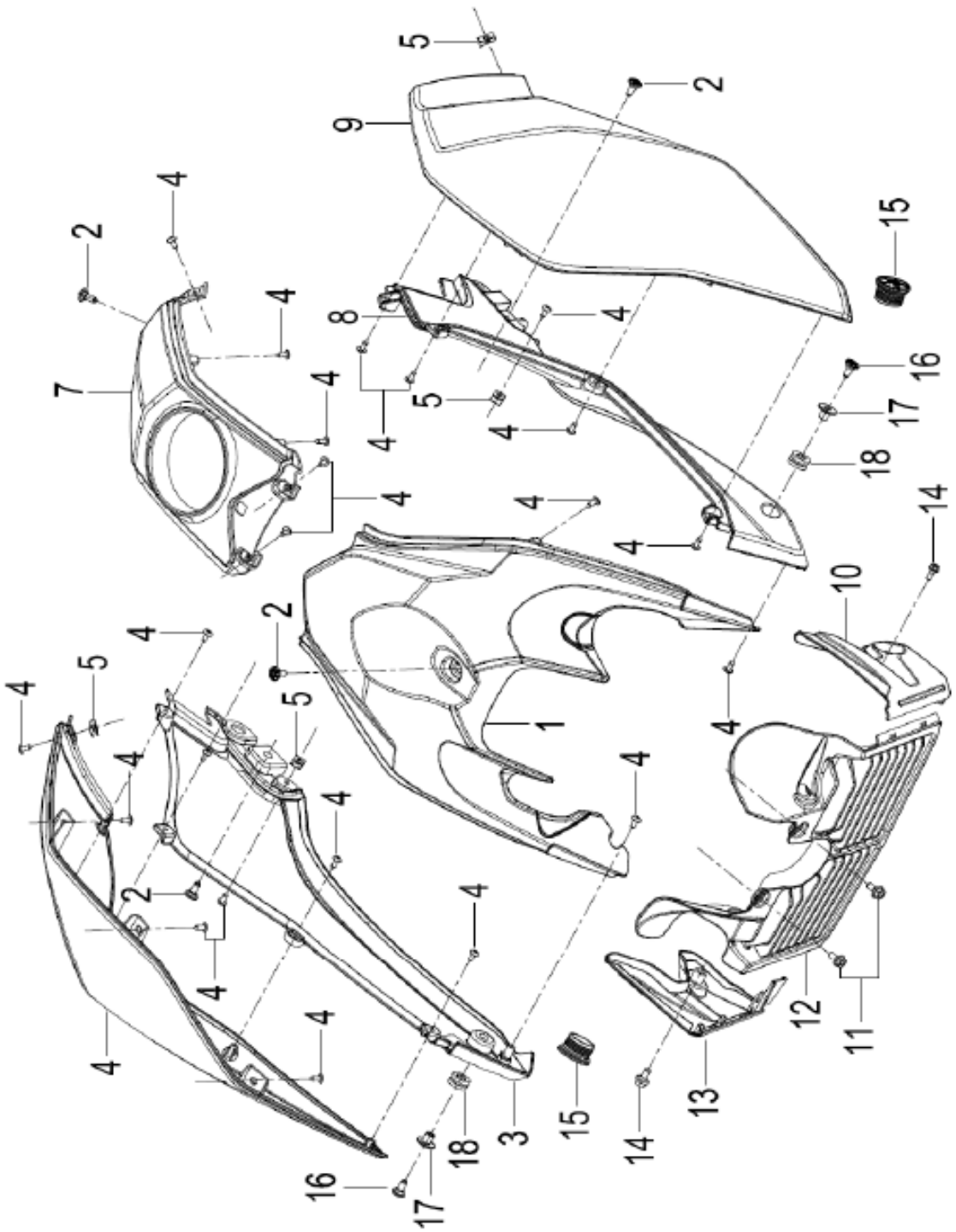
R: spare parts

Fender Exploded View



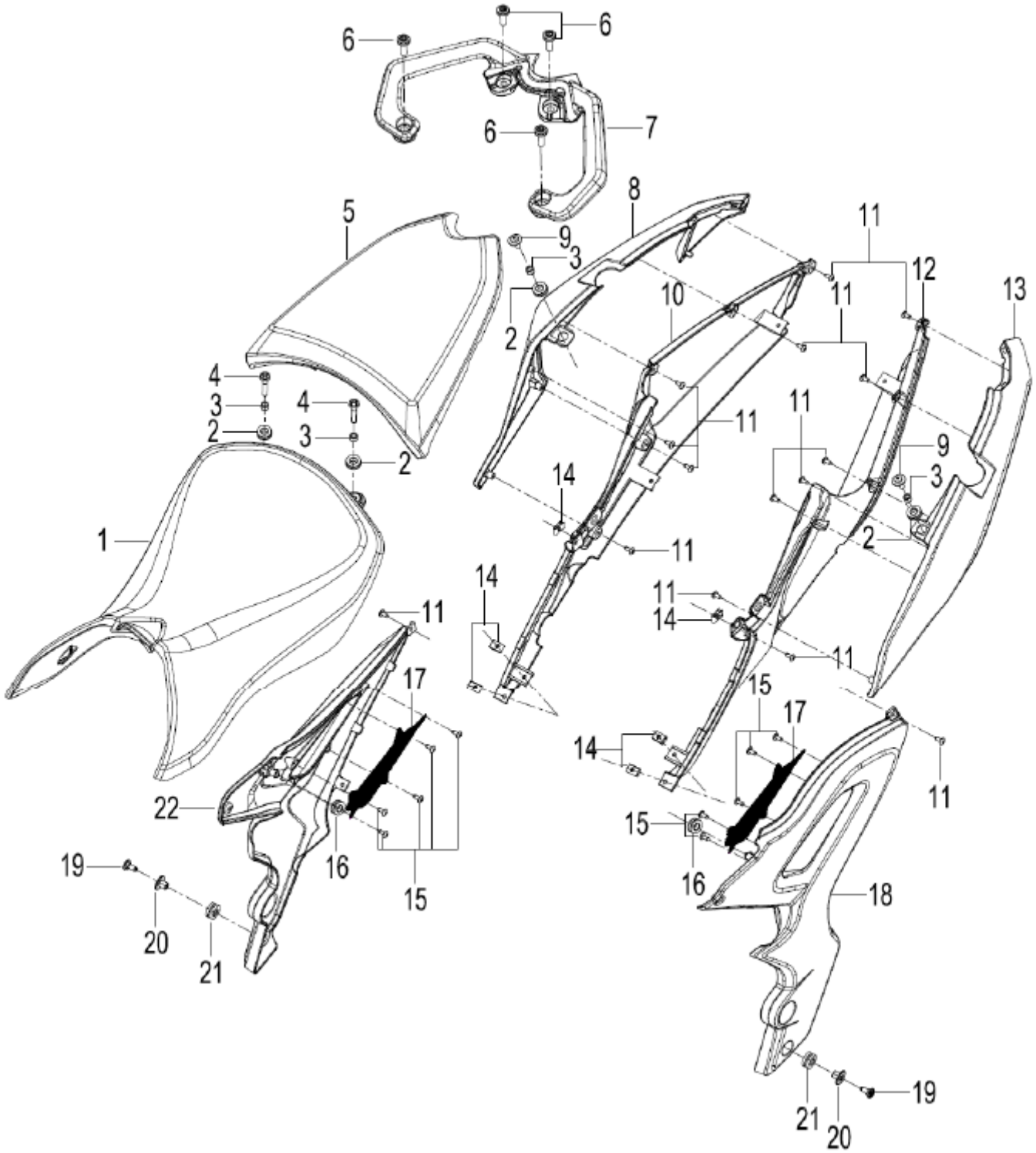
No.	Parts and specification	Torque		Remark
		N·m	kgf·m	
1	Front part of rear fender			
2	Screw M6×15.2	10	1.0	
3	Screw M6×14	10	1.0	
4	Bolt M6×30	10	1.0	
5	Grey nylon gasket			
6	Front fender installing plate			
7	Tapping screw ST4.2×13			
8	Bolt M5×0.8×14	4.5	0.5	
9	T-shape bush 5×7×6×10×0.8			
10	Fender			
11	Nut M5	4.5	0.5	
12	Body Covers installing clamping nut M5	4.5	0.5	
13	Front small fender			
14	Gasketφ5			
15	Spring gasketφ5			
|6	Screw M5×12	4.5	0.5	
17	Rear fender left part			
18	Allen bolt M6×25	10		
19	Side reflector			
20	Rear reflector			
21	Bolt M6×16	10	1.0	
22	Rear license plate bracket			
23	Rear fender right part			
24	Nut M6	10	1.0	
25	Bolt M6×12	10	1.0	
26	Rear fender rubber pad I			

Body CoversFuel Tank Garnish Plates Exploded View



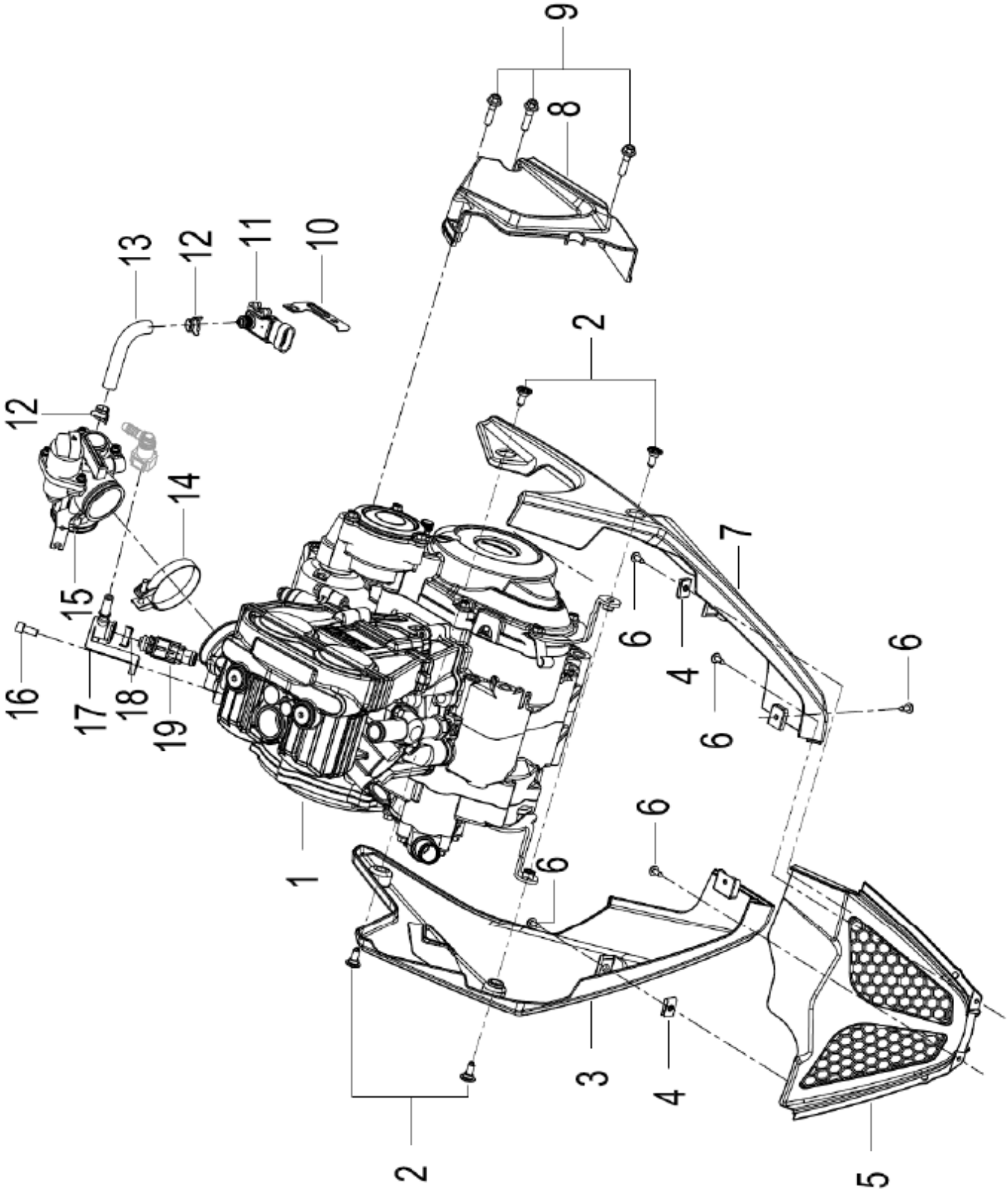
No.	Parts and specification	Torque		Remark
		N·m	kgf·m	
1	Oil tank front Body Covers			
2	Screw M6×15.2	10	1.0	
3	Right fuel tank decorating plate			
4	Right Body CoversFuel Tank Garnish Plates			
5	Card ST4.2			
6	Tapping screw ST4.2×13			
7	Fuel tank upper Body Covers			
8	Left fuel tank decorating plate			
9	Left Body CoversFuel Tank Garnish Plates			
10	Front right decorating cover			
11	Bolt M6×12	10	1.0	
12	Front decorating cover			
13	Front left decorating cover			
14	Bolt M6×16	10	1.0	
15	Front fixing bracket decorating cover of engine			
|6	Stainless screw M6×25	10	1.0	
17	Bush			
18	Body Covers rubber pad			

Seat Cushion and Body Covers Exploded View



No.	Parts and specification	Torque		Remark
		N·m	kgf·m	
1	Front seat component			
2	Rubber sleeve			
3	T-shape bush			
4	Bolt M6×25	10	1.0	
5	Rear seat component			
6	Rear luggage carrier screw I	22	2.2	
7	Rear handrail			
8	Right upper tail cover			
9	Combination screw M6×16	10	1.0	
10	Right lower tail cover			
11	Tapping screw ST4.2×13			
12	Left lower tail cover			
13	Left upper tail cover			
14	Card ST4.2			
15	Tapping screw ST4.2×9.5			
|6	Rubber sleeve			
17	Protecting wire net			
18	Left Body Covers			
19	Stainless screw M6×30	10	1.0	
20	Bush			
21	Body Covers rubber pad			
22	Right Body Covers			

Bottom Cover and Engine Exploded View

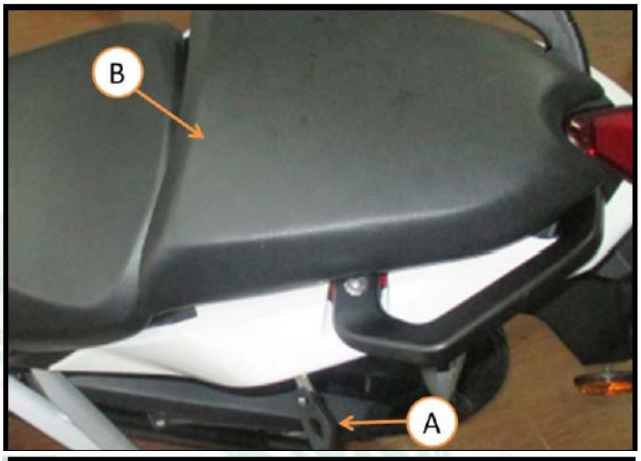


No.	Parts and specification	Torque		Remark
		N·m	kgf·m	
1	Tapping screw ST4.2×13			
2	Bottom cover mesh			
3	Card ST4.2			
4	Right bottom cover			
5	Stainless screw M6×25			
6	Screw M6×15.2	10	1.0	
7	Engine			
8	Injector			
9	Injector seat			
10	Allen bolt M6×15	10	1.0	
11	Throttle valve body subassembly			
12	Clamp component			
13	Clamp			
14	MAP pipe			
15	Intake pressure sensor			
16	Intake pressure sensor bracket			
17	Bolt M6×25	10	1.0	
18	Left rear cover component			
19	Left bottom cover			

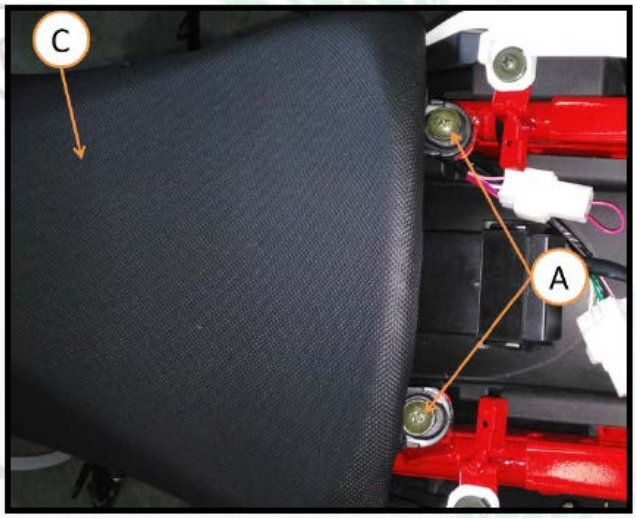
Seat Cushion

Disassembling Seat Cushion

●Insert the key [A] into the seat lock, turn the key counterclockwise open the seat [B] and lift up to remove the rear seat.



●Removing:
Screw [A]
Front seat [C]



Installing Seat Cushion

●Install the parts disassembled previously.

●Press down the rear part of seat until the click sound is generated by the seat lock.

Body Covers

Disassembling Left Body Covers

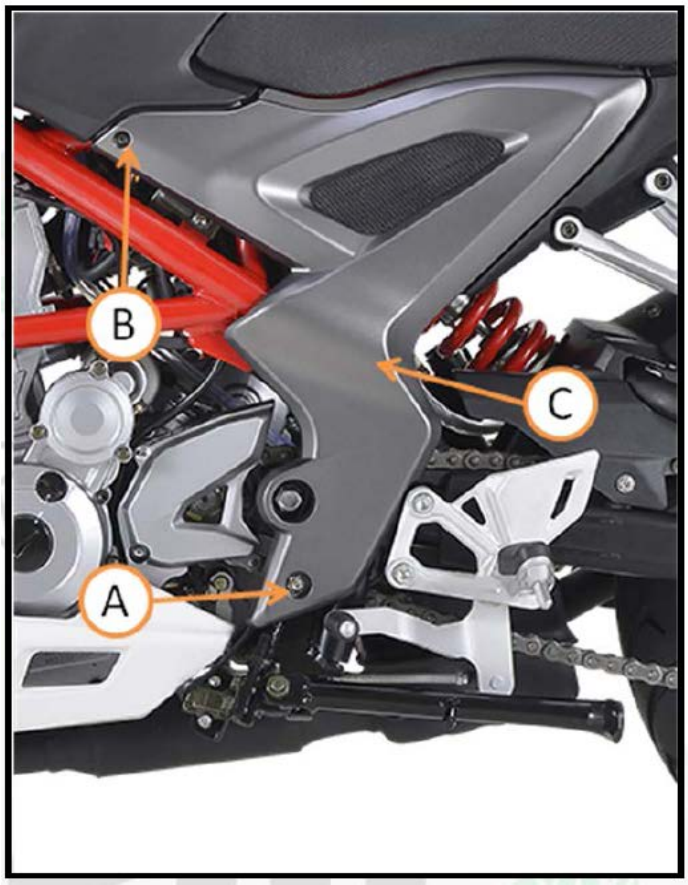
●Disassemble the seat (see “Seat”—“Disassembling Seat”)

●Disassembling:

Screw [A]

Tapping screw [B]

Left Body Covers [C]



Installing Left Body Covers

●Install the parts disassembled previously.

Disassembling Right Body Covers

●Disassemble the seat (see “Seat”—“Disassembling Seat”)

●Disassembling:

Screw [A]

Tapping screw [B]

Left Body Covers [C]

Installing Right Body Covers

●Install the parts disassembled previously.

Rear Handrail and Tail Cover

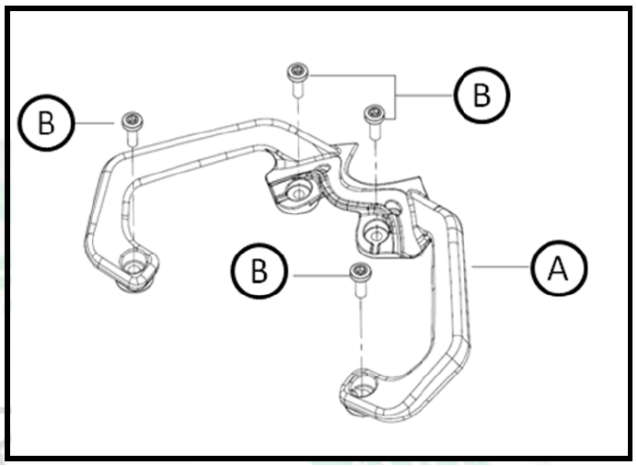
Disassembling Rear Handrail

●Disassemble the rear seat (see “Seat”—“Disassembling Seat”)

●Disassembling:

Screw [B]

Rear handrail [A]



Installing Rear Handrail

●Install the parts disassembled previously.

Fastening torque of rear handrail mounting bolt: 25 N·m

Disassembling Tail Cover

●Disassemble the seat (see “Seat”—“Disassembling Seat”)

●Disassemble the left Body Covers (see “Body Covers”—“Disassembling Left Body Covers”)

●Disassemble the right Body Covers (see “Body Covers”—“Disassembling Right Body Covers”)

●Disassemble the rear handrail (see “Rear Handrail and Tail Cover”—“Disassembling Rear Handrail”)

●Disassembling:

Screw [E]

Right tail cover [A]

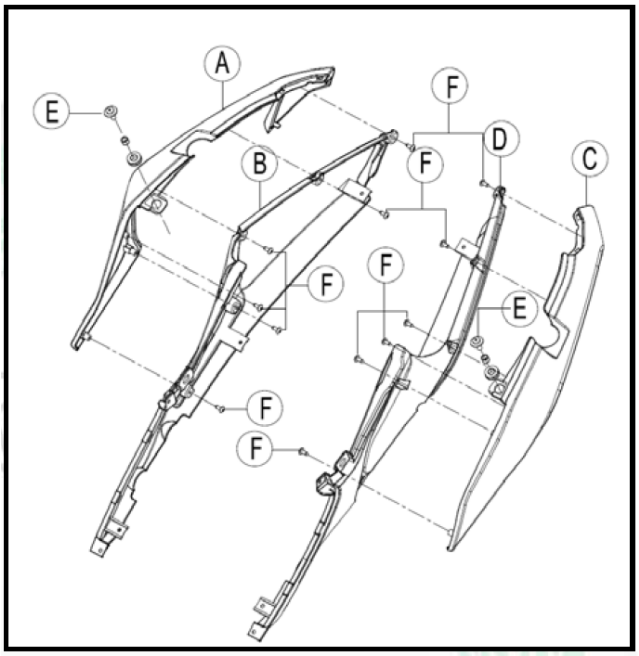
Right lower tail cover [B]

Left tail cover [C]

Left lower tail cover [D]

Bolt [E]

Tapping screw [F]



Installing Tail Cover

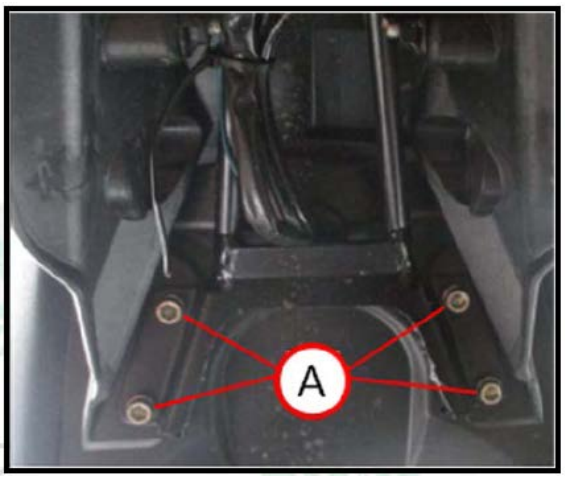
●Install the parts disassembled previously.

Rear Fender

Disassembling Rear Fender

●Disassemble the screw [A] and then remove the rear fender bracket from the frame

●Unplug the rear turn signal and rear license plate lamp connectors



●Removing:

Rear fender left part [A]

Rear fender right part [B]

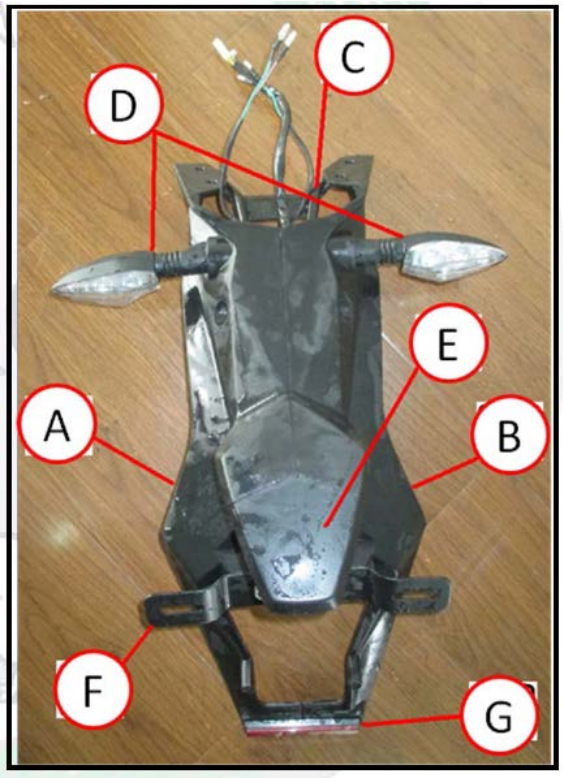
Rear fender bracket [C]

Rear turn signal [D]

Rear license plate lamp [E]

Rear license plate bracket [F]

Rear reflector [G]



Installing Rear Fender

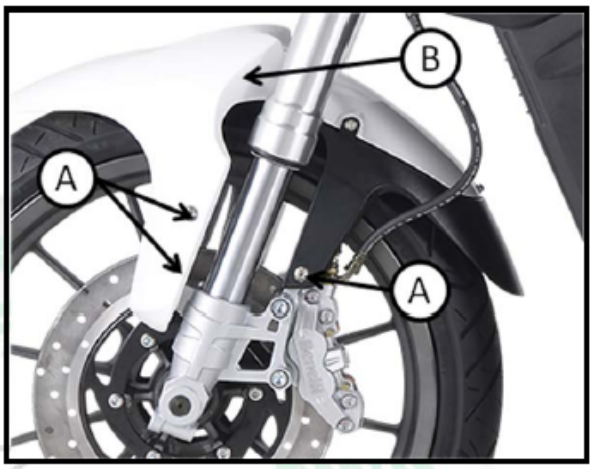
●Install the parts disassembled previously.

Torque of rear fender bracket fastening screw: 10 N·m

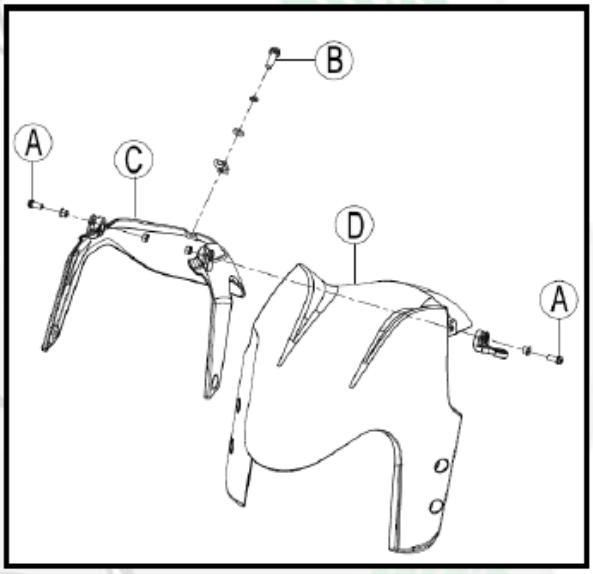
Front Fender

Disassembling Front Fender

●Disassemble the screw [A] and remove the front fender [B] from the front shock absorber



●Removing:
Screw [A]
Screw [B]
Front small fender [C]
Front fender [D]



Installing Front Fender

●Install the parts disassembled previously.

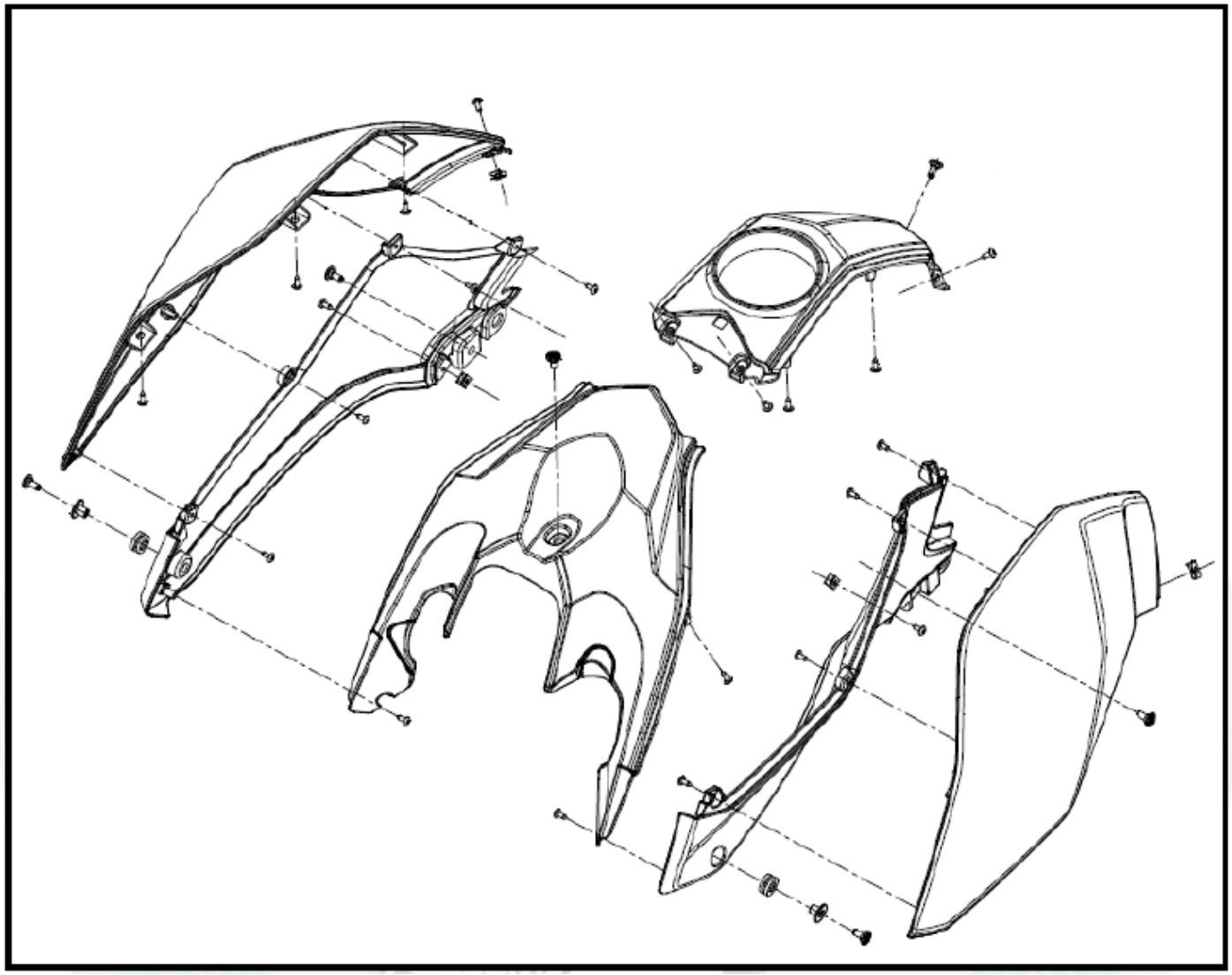
Body CoversFuel Tank Garnish Plates and Fairing

Disassembling Body CoversFuel Tank Garnish Plates

●Disassemble the seat (see “Seat”—“Disassembling Seat”)

●Disassemble the fuel tank (see “Fuel Tank”—“Disassembling Fuel Tank”)

●Decompose the Body CoversFuel Tank Garnish Plates



Installing Body CoversFuel Tank Garnish Plates

●Install the parts disassembled previously.

Radiator Fairing

Disassembling Radiator Fairing

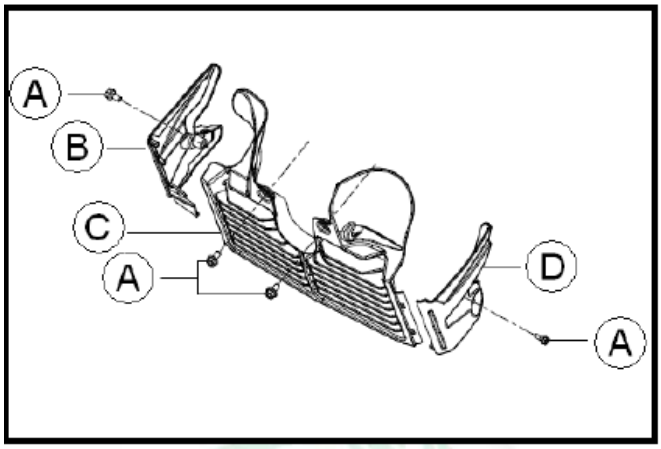
●Disassembling

Bolt [A]

Front right decorating cover [B]

Front decorating cover [C]

Front left decorating cover [D]



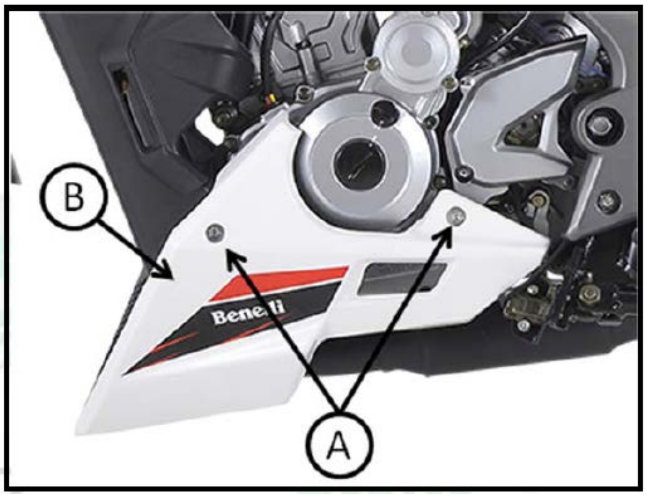
Installing Radiator Fairing

●Install the parts disassembled previously.

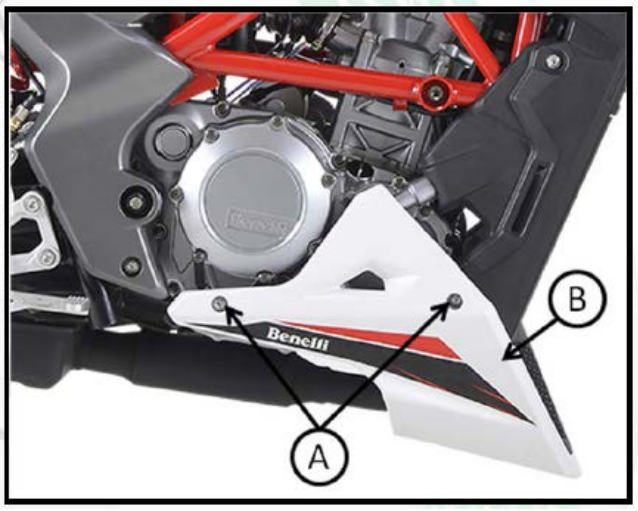
Bottom Cover

Disassembling Bottom Cover

●Disassemble the fastening bolt [A] of left bottom cover [B].

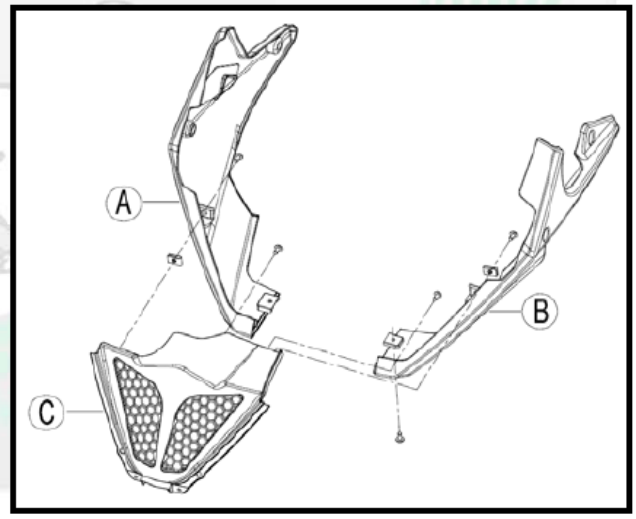


●Disassemble the fastening bolt [A] of right bottom cover [B].



●Unfasten the buckle inside the plastic part combination.

●Separate the left bottom cover [B], right bottom cover [A] and bottom cover mesh [C].



Installing Bottom Cover

●Install the parts disassembled previously.

Frame

Disassembling Frame

●Removing:

Seat (see “Seat”—“Disassembling Seat”)

Fuel tank (see “Fuel Tank”—“Disassembling Fuel Tank”)

Body Covers (see “Body Covers”—“Disassembling Body Covers”)

Tail cover (see “Tail Cover”— “Disassembling Tail Cover”)

Rear fender (see “Rear Fender” — “Disassembling Rear Fender”)

Rear wheel (see “Rear Wheel” — “Disassembling Rear Wheel”)

Front wheel (see “Front Wheel” — “Disassembling Front Wheel”)

Front fork (see “Disassembling Front Fork”)

Muffler (see “Disassembling Muffler”)

Rear swing arm (see “Rear Swing Arm”—“Disassembling Rear Swing Arm”)

Engine (see “Disassembling Engine”)

Side stand (see “Seat”—“Disassembling Body Covers”)

Front and rear left pedals (see “Disassembling Front Left Pedal” and “Disassembling Rear Left Pedal”)

Front and rear right pedals (see “Disassembling Front Right Pedal” and “Disassembling Rear Right Pedal”)

●Disassemble the cables and other electric parts.

Installing Frame

●Install the parts disassembled previously (see the corresponding chapters).

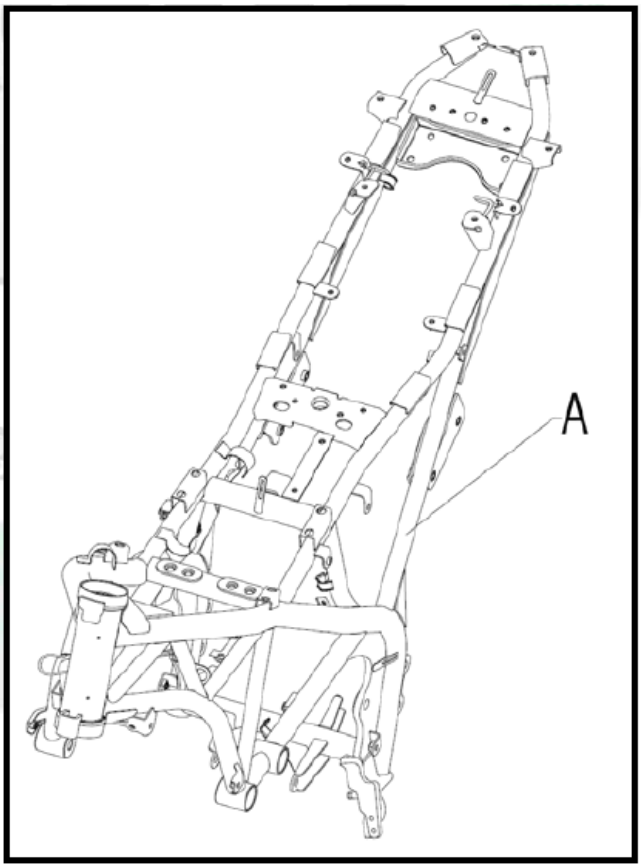
Checking Frame

●Visually check whether there is crack, depression, bending or deformation on the frame [A].

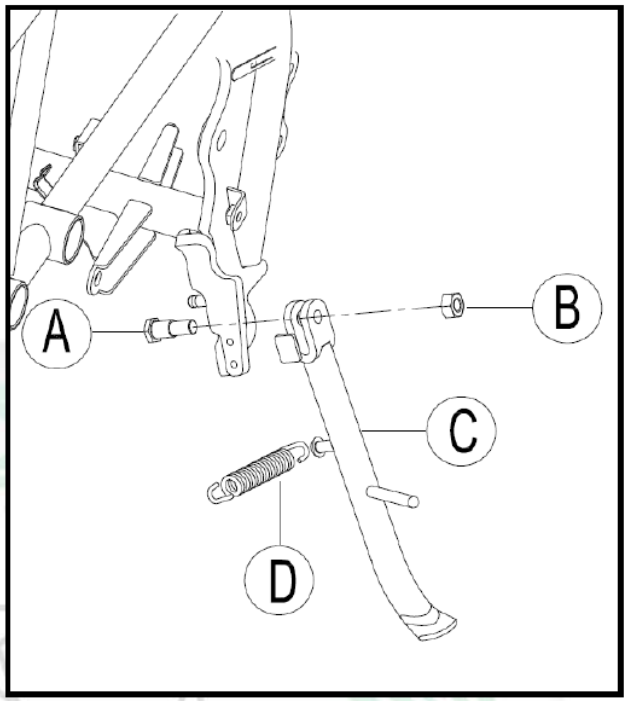
★If the frame is damaged, please replace it!

⚠Warning

Do not attempt to adjust or repair the frame, which may cause accidents, so please replace the frame if the crack, depression, bending or deformation occurs on it!



Side Stand



Disassembling Side Stand

●Lift the rear wheel above the ground by using the bike stand.

●Removing:

Side stand spring [D],

Nut [B],

Side stand bolt [A],

Side stand [C],

Installing Side Stand

●Apply the grease to the moving part of side stand [C].

●Apply the Loctite to the thread of side stand bolt [A].

●Tighten the bolt and lock it with the nut [B].

Locking torque:

Side stand bolt [A]: 50 N·m

Side stand bolt locknut [B]: 45 N·m

●Install the spring [D] with longer end to face up.

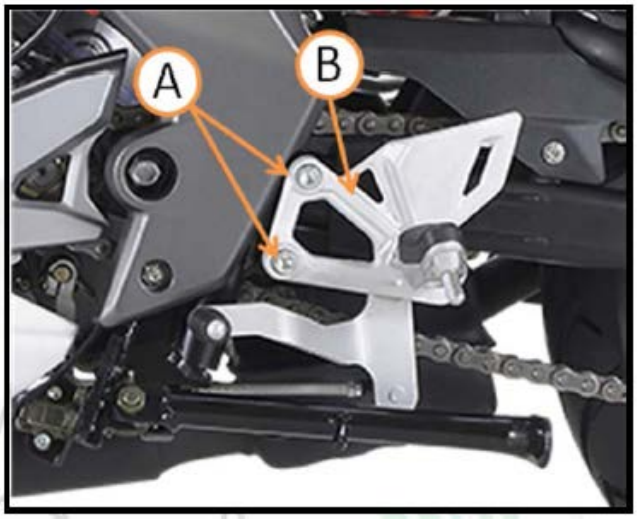
Left Front Pedal

Disassembling Left Front Pedal

●Disassembling:

Screw [A]

Left front pedal bracket [B]



●Disassembling

Shift foot bar component [A]

Shift foot bar installing seat assembly [C]

Pedal installing pin [B]

Left front pedal bracket [D]

Left front pedal component [E]

Pedal installing bush [F]

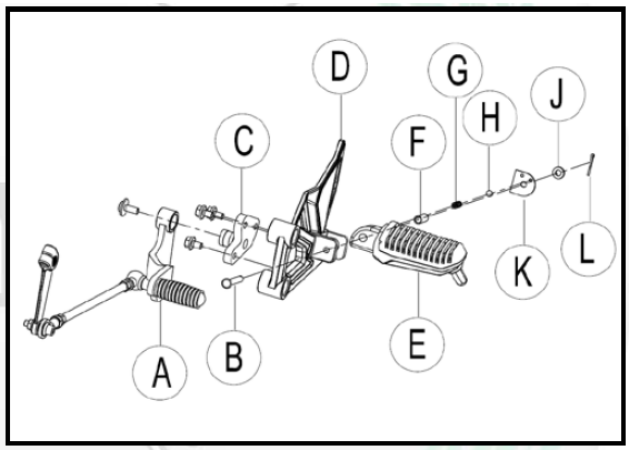
Front pedal spring [G]

Steel ball [H]

Pedal installing plate [K]

Gasket [J]

Cotter pin [L]



Installing Left Front Pedal

●Before installation, apply the grease to the pedal installing bush.

●Install the parts disassembled previously

Locking torque:

Shift foot bar installing seat assembly mounting bolt: 10N·m

Left front pedal bracket fixing screw: 45N·m

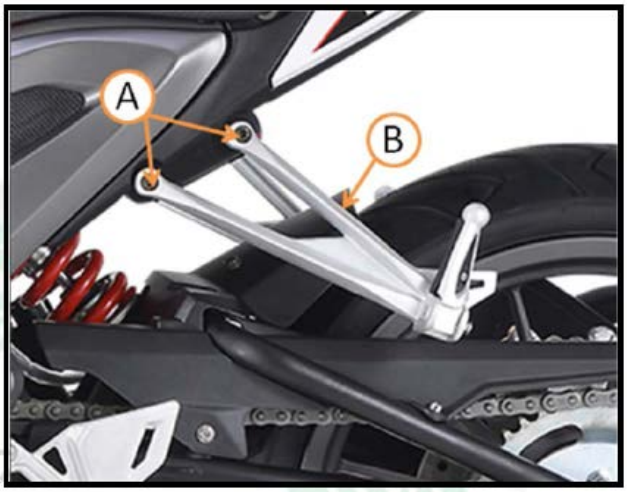
Left Rear Pedal

Disassembling Left Rear Pedal

●Disassembling:

Screw [A]

Left rear pedal bracket [B]



●Disassembling

Left rear pedal bracket [A]

Check ring [B]

Pedal installing plate [C]

Pedal ball [D]

Pedal Spring [E]

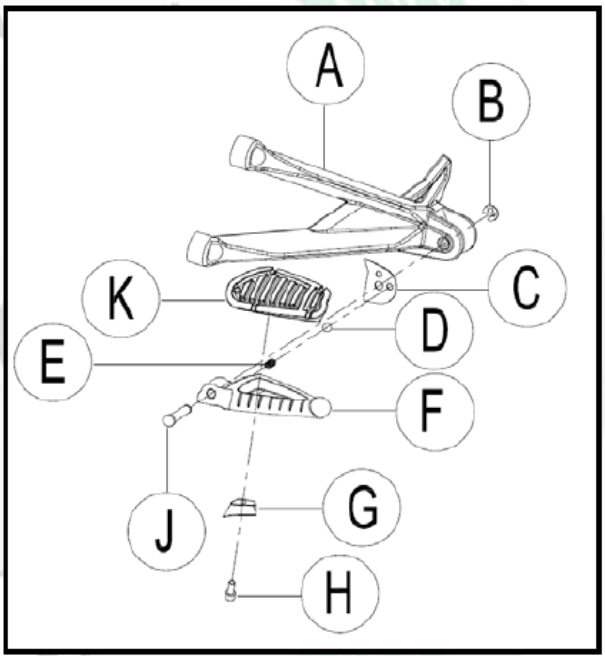
Left rear pedal [F]

Left pedal rubber pad [G]

Screw [H]

Pedal installing pin [J]

Left pedal rubber [K]



Installing Left Rear Pedal

●Before installation, apply the grease to the pedal installing pin.

●Install the parts disassembled previously

Locking torque:

Left rear pedal bracket fixing screw: 45 N·m

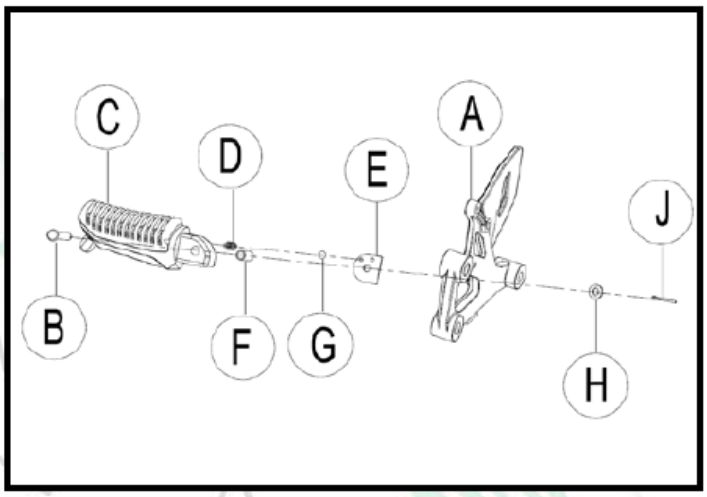
Front Right Pedal

Disassembling Front Right Pedal

●Disassemble the right front pedal bracket (see "Brake"—"Disassembling Brake Pedal")

●Disassembling

Right front pedal bracket [A]
Pedal installing pin [B]
Right front pedal component [C]
Front pedal spring [D]
Pedal installing plate [E]
Pedal installing bush [F]
Steel ball [G]
Gasket [H]
Cotter pin [J]



Installing Front Right Pedal

●Before installation, apply the grease to the pedal installing bush.

●Install the parts disassembled previously

Locking torque:

Right front pedal bracket fixing screw: 25 N·m

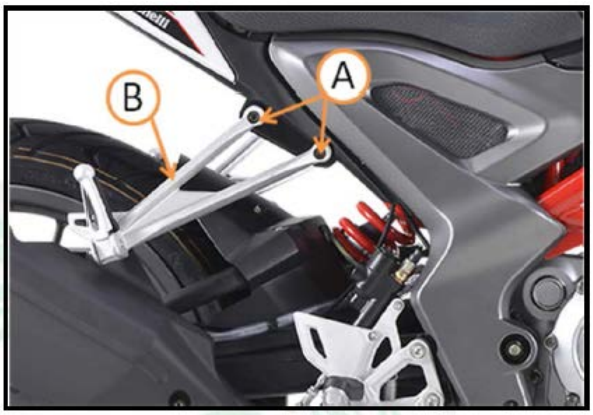
Rear Right Pedal

Disassembling Rear Right Pedal

●Disassembling:

Screw [A]

Right rear pedal bracket [B]



●Disassembling

Right rear pedal bracket [A]

Check ring [B]

Pedal installing plate [C]

Pedal ball [D]

Pedal spring [E]

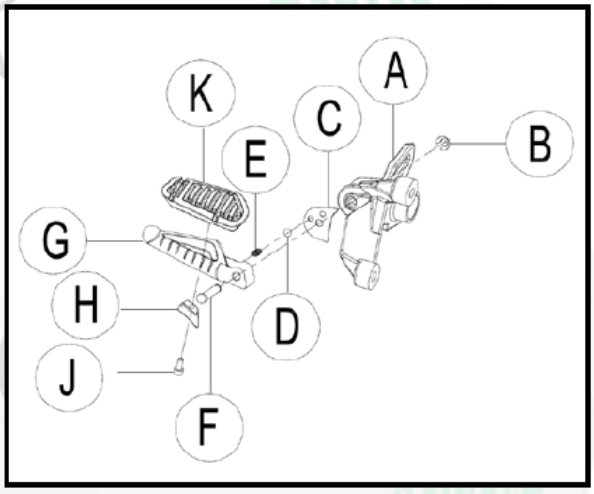
Right rear pedal [F]

Right pedal rubber pad [G]

Screw [H]

Pedal installing pin [J]

Left pedal rubber [K]



Installing Rear Right Pedal

●Before installation, apply the grease to the pedal installing pin.

●Install the parts disassembled previously

Locking torque:

Right rear pedal bracket fixing screw: 25 N·m

Muffler

⚠Warning

Do not disassemble the muffler when the engine is heated to avoid burn. Disassemble the muffler when it is cooled.

Disassembling Muffler

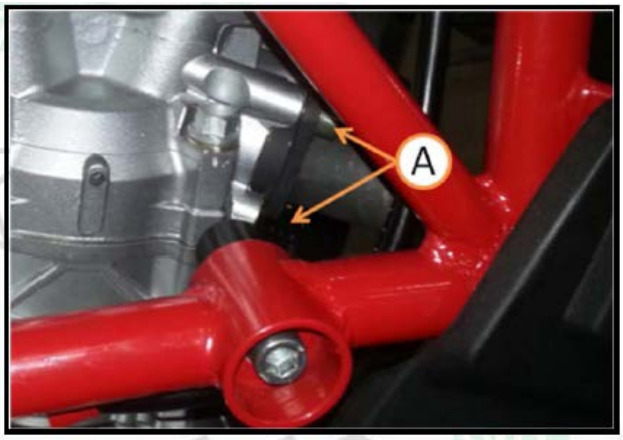
●Removing:

Bottom cover (see “Bottom Cover”—“Disassembling Bottom Cover”),

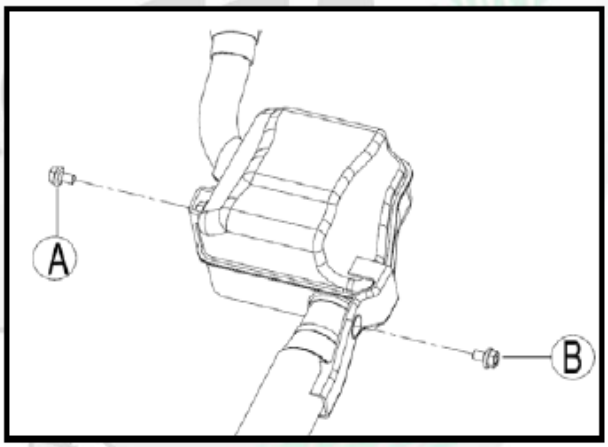
Oxygen sensor (see “Electrical System”—“Disassembling Oxygen Sensor”)

Right rear pedal (see “Right Rear Pedal”—“Disassembling Right Rear Pedal”)

●Remove the exhaust front pipe fixer screw [A].

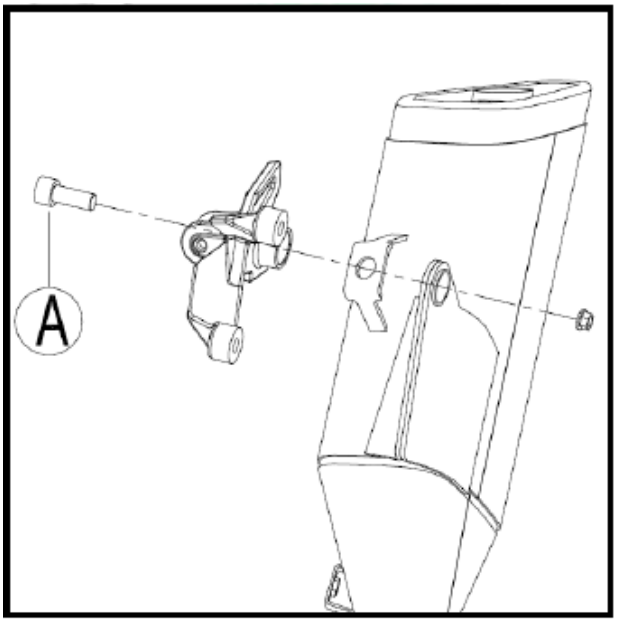


●Remove the muffler and frame mounting bolt [A] and bolt [B].



●Remove the muffler rear mounting bolt [A] on the rear pedal bracket.

●Remove the muffler



Installing Muffler

●Replace the exhaust pipe gasket[A] with a new one.

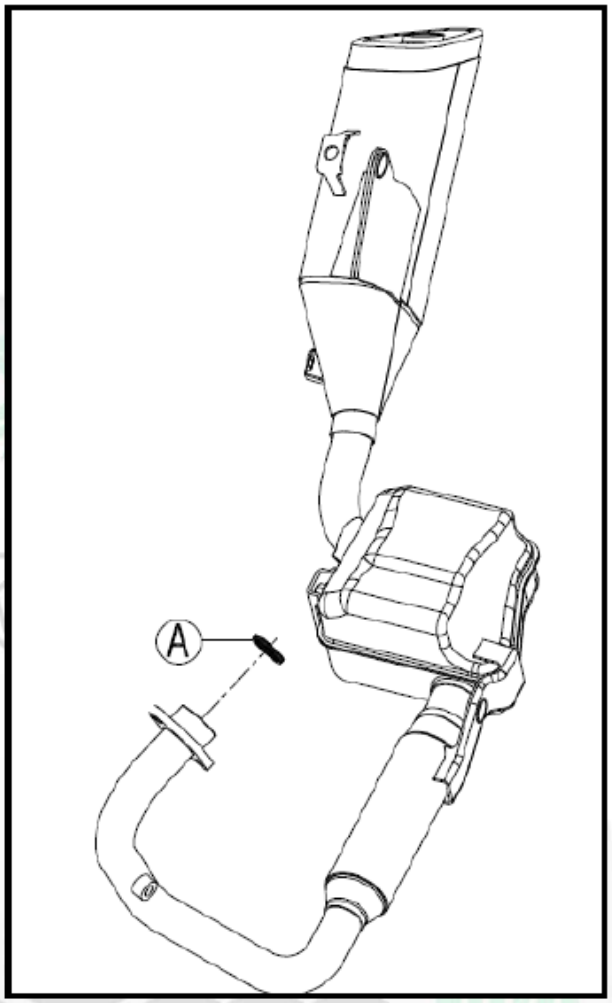
Locking torque:

Exhaust front pipe fixing screw: 22N·m

Muffler lower mounting bolt: 22N·m

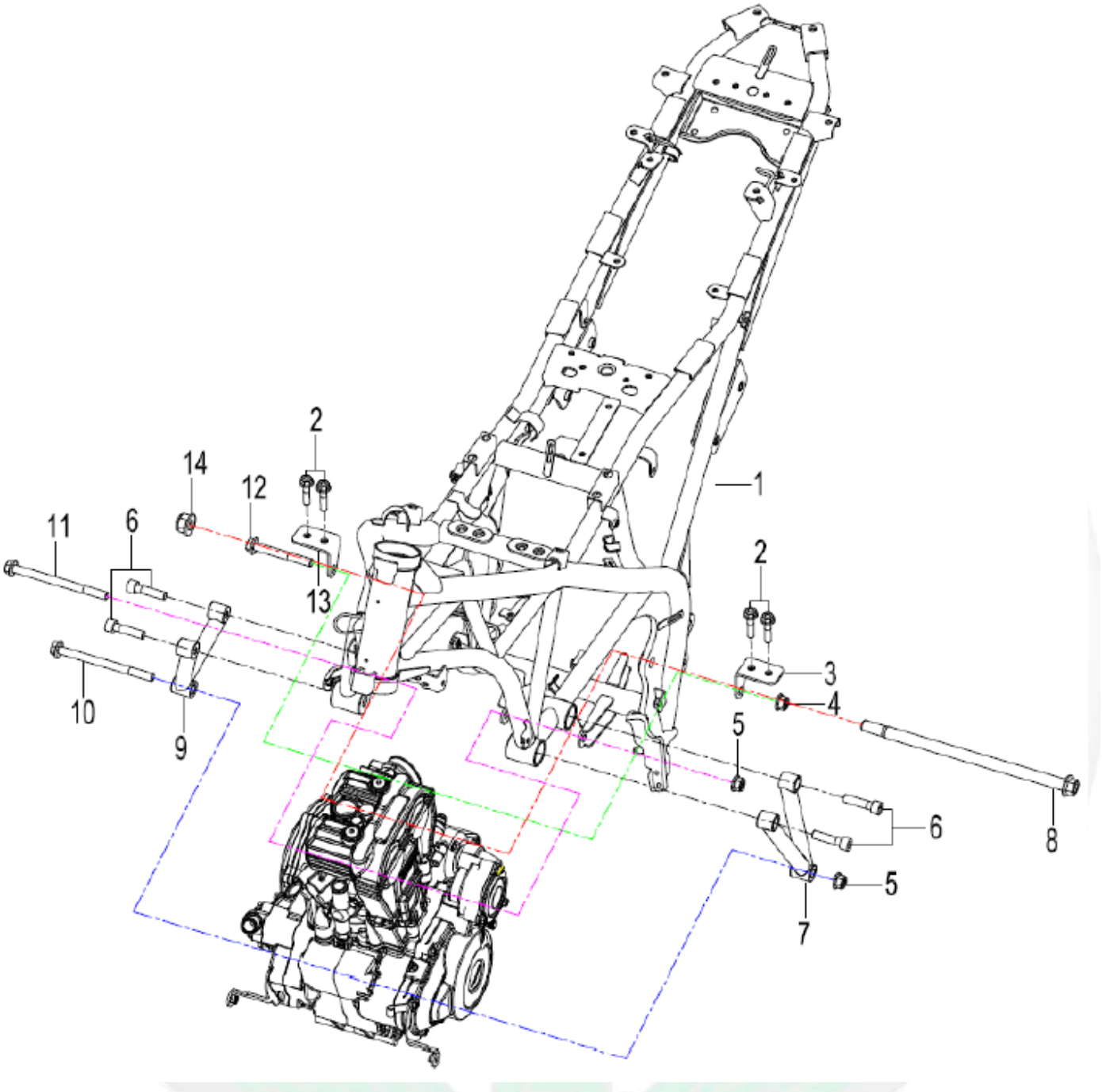
Muffler rear fixing screw: 22N·m

●Install the parts disassembled previously (see the corresponding chapters).



Disassembling/Installing Engine

Engine Disassembly and Installation Exploded View



No.	Parts and specification	Torque			Remark
		N·m	kgf·m	ft·lb	
1	Frame assembly				
2	Bolt M8×35	22			
3	Left upper hanging plate component of engine				
4	Nut M10×1.25	45			
5	Nut M10×1.25	45			
6	Allen bolt M10×40	40			
7	Front left fixing bracket component of engine				
8	Rear swing arm shaft	120			M
9	Front right fixing bracket component of engine				
10	Bolt M10×1.25×170	45			S, M
11	Bolt M10×1.25×130	45			S, M
12	Bolt M10×50	40			S, M
13	Right upper hanging plate component of engine				
14	Nut M14×1.5				

M: apply the molybdenum disulphide grease.

R: replace parts

S: obey the specified tightening order.

Disassembling Engine

●Support the rear part of swing arm with a bracket.

●Grasp the brake handle/pedal slowly and bind it with a tape.

⚠Warning

The brake handle/pedal must be grasped when disassembling the engine, otherwise the motorcycle will topple, which will cause accidents and personal injury.

●Drain the oil (see "Regular Maintenance"—"Replacing Oil"),

●Drain the coolant (see "Regular Maintenance"—"Replacing Coolant");

●Removing:

Bottom cover (see "Frame"—"Disassembling Bottom Cover"),

Seat (see "Frame"—"Disassembling Seat")

Body Covers (see "Frame"—"Disassembling Body Covers"),

Fuel tank (see "Fuel Injection System (EFI)"—"Disassembling Fuel Tank"),

Radiator fairing (see "Frame"—"Disassembling Radiator Fairing")

Expansion water tank (see "Regular Maintenance"—"Replacing Coolant"),

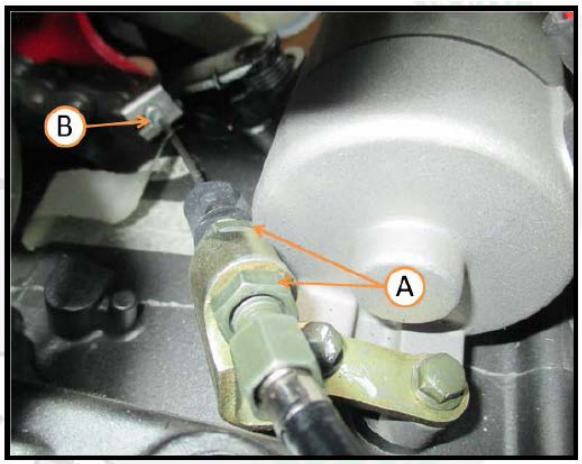
Radiator (see "Cooling System"—"Disassembling Radiator and Radiator Fan"),

Muffler (see "Frame"—"Disassembling Muffler"),

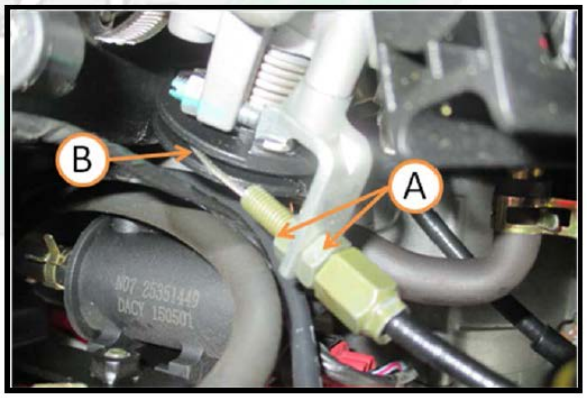
Drive chain (see "Drive"—"Disassembling Drive Chain")

●Support the engine with a suitable bracket [B] to make the engine be balanced.

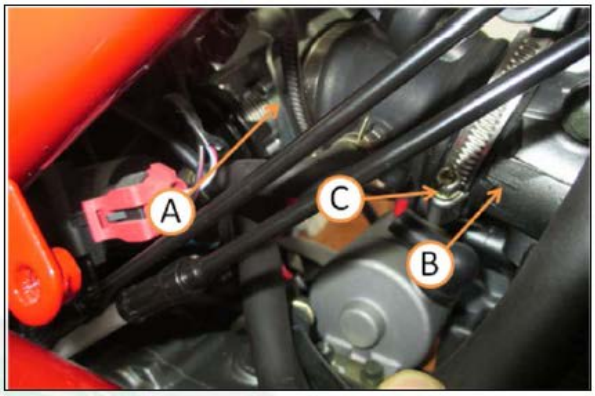
●Loosen the nut [A] and remove the clutch cable connector [B]



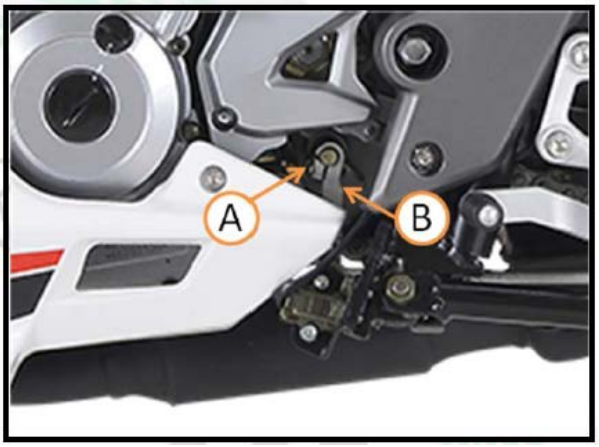
●Loosen the nut [A] and remove the throttle cable connector [B]



●Loosen the clamp [C] at the connection position of throttle [A] and engine [B]



●Remove the shift lever swing arm

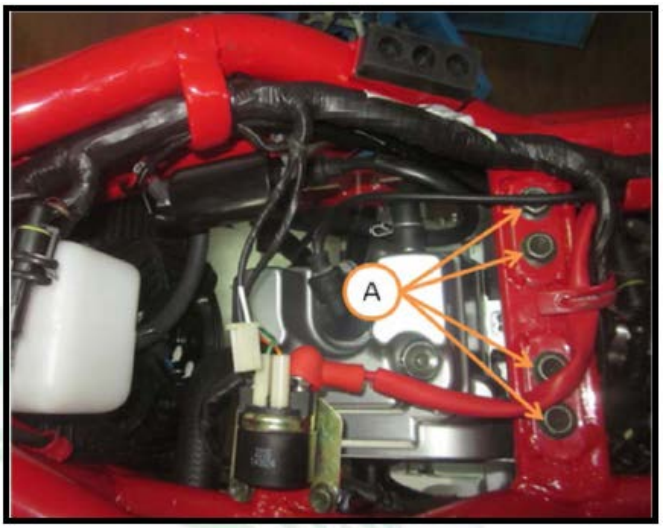


●Disconnect the various cable connectors

●Loosening:
Upper mounting bolt of engine [A],

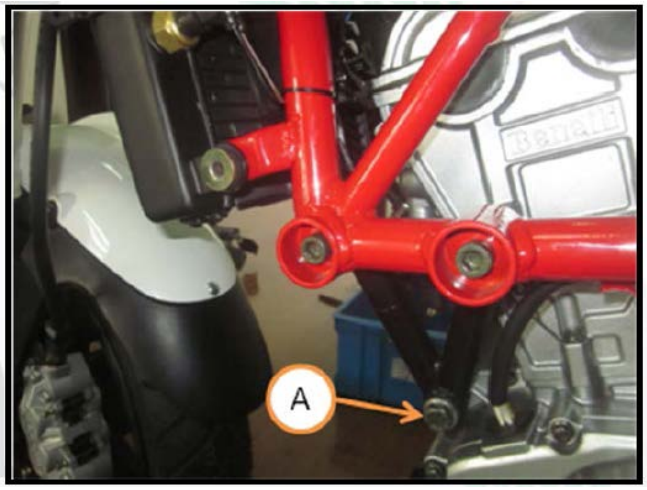
●Removing:

Upper hanging plate mounting bolt of engine [A],



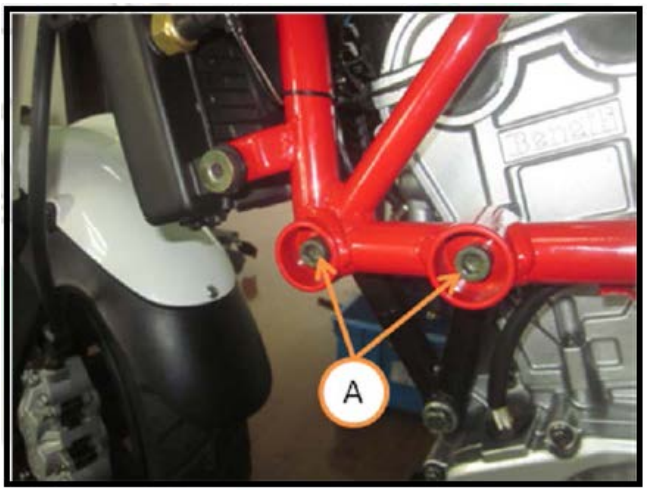
●Loosening:

Front mounting bolt of engine [A],



●Removing:

Front left fixing bracket component mounting bolt of engine [A]

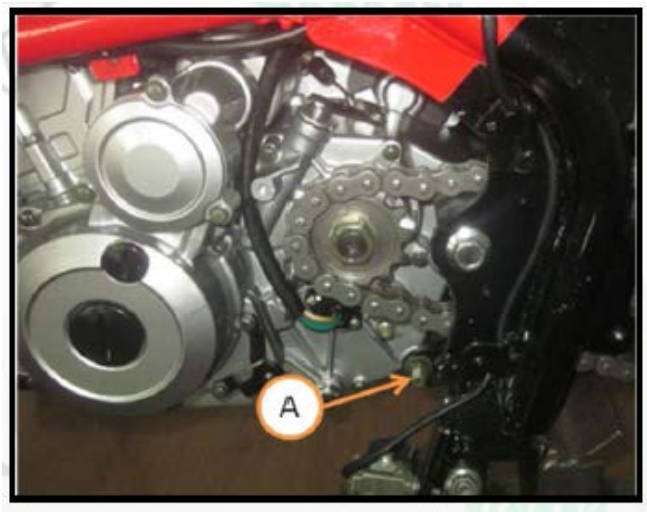


●Removing:

Front right fixing bracket component mounting bolt of engine [A]

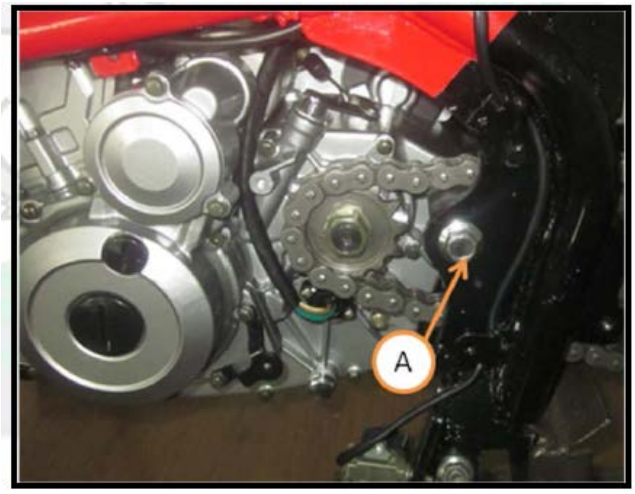
●Removing:

Remove the rear lower fixing nut of engine [A]



●Removing

Rear swing arm shaft [A]

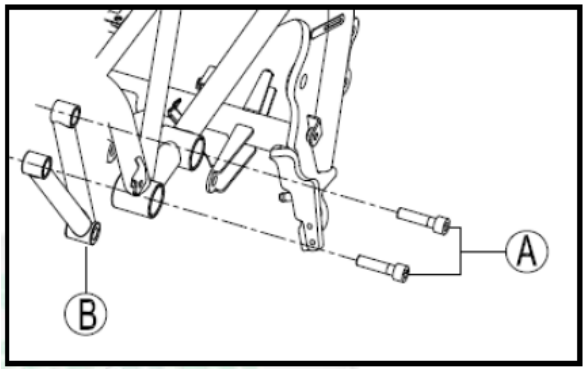


●Remove the engine by using the bike stand or hoist

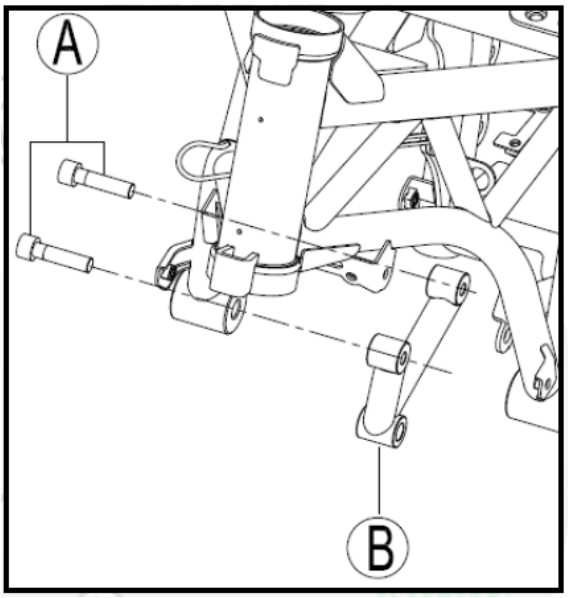
Installing Engine

●Support the engine with a suitable stand or hoist.

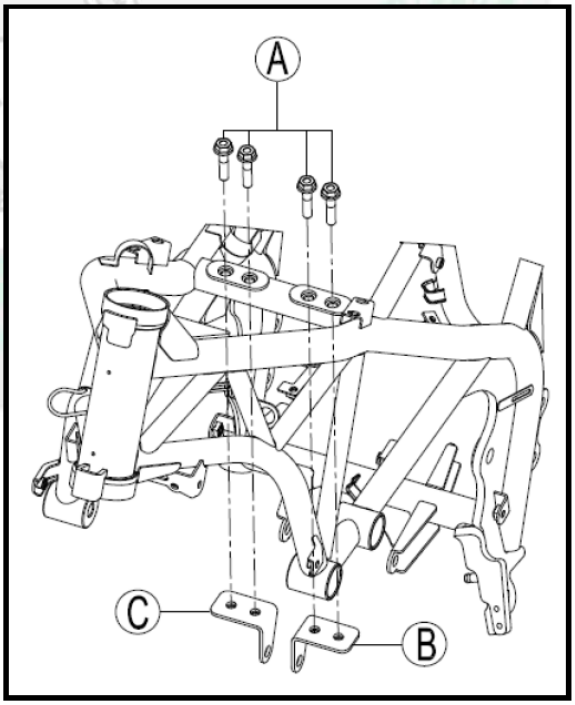
●Install the front left fixing bracket component of engine [B] and do not tighten the screw [A]



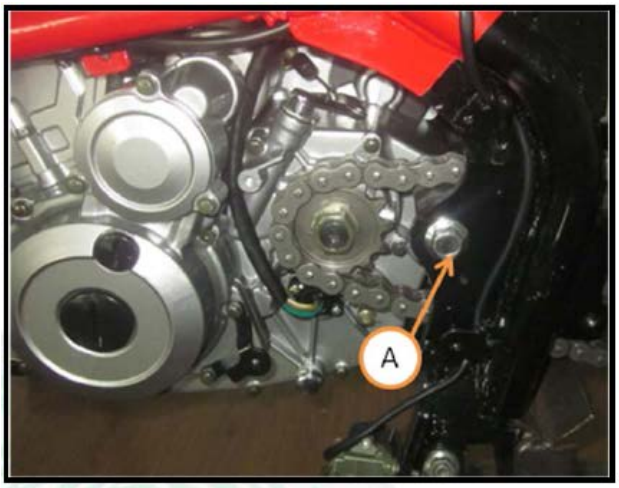
●Install the front right fixing bracket component of engine [B] and do not tighten the screw [A]



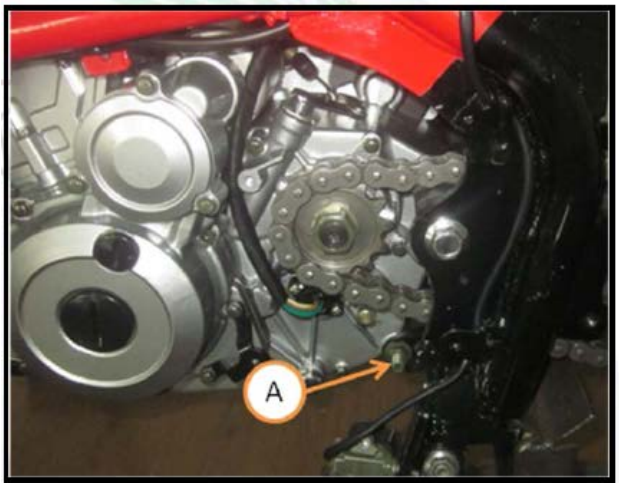
●Install the left upper hanging plate component [B] and right upper hanging plate component [C] of engine and do not tighten the bolt [A]



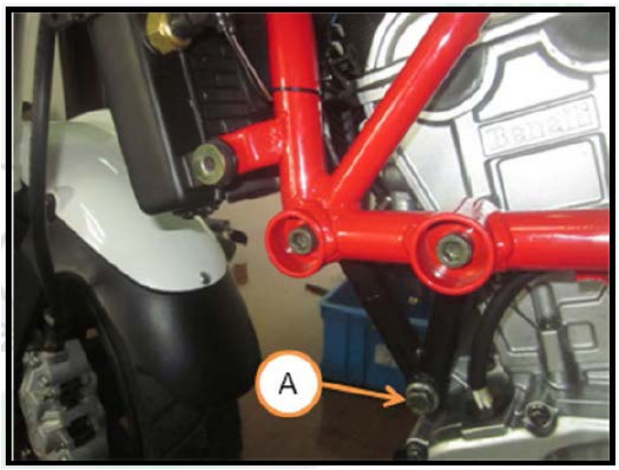
●Install the rear swing arm shaft [A] and do not tighten it;



●Install the rear lower fixing nut of engine [A] and do not tighten it;



●Install the front mounting bolt of engine [A] and do not tighten it;



●Fasten the bolt, screw or nut according to the following steps:

○Step 1: lock the rear swing arm shaft

○Step 2: lock the rear lower mounting bolt of engine

○Step 3: lock the front mounting bolt of engine

○Step 4: lock the upper mounting bolt of engine

○Step 5: lock the engine bracket screws at the left and right sides.

○Step 6: lock the upper hanging plate mounting bolt of engine.

○Step 7: mark each fastening bolt, screw and nut which have been locked to the specified torque.

Remark
○*Fasten the engine mounting bolt, screw or nut in order by three times*

○Locking torque:

Rear swing arm shaft: 108N·m

Rear lower mounting bolt of engine: 50N·m

Upper mounting bolt of engine: 50N·m

Front mounting bolt of engine: 50N·m

Front bracket fixing screw of engine: 45N·m

Upper hanging plate mounting bolt of engine: 25N·m

●Arrange the lead, cable and hose properly (see "Appendix"—"Winding Method of Cable, Wire and Hose").

●Install the parts disassembled previously (see the corresponding chapters).

●Adjusting:

○Throttle cable (see "Regular Maintenance"—"Checking Throttle Steering system"),

○Drive chain (see "Regular Maintenance"—"Checking Slackness of Drive Chain")

●Fill the engine with oil (see "Regular Maintenance"—"Replacing Oil").

●Add the coolant to the engine and drain the air in the cooling system (see "Regular Maintenance"—"Replacing Coolant").

CHAPTER VII ELECTRICAL SYSTEM

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Precautions

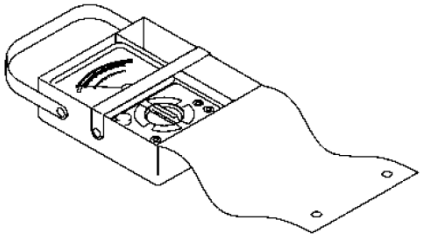
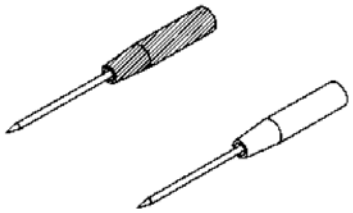
Many important precautions must be understood when maintaining the electrical system. Learn and follow all of the following rules.

- Do not reverse the positive and negative electrodes of storage battery, otherwise the diode of electrical components will be burnt.
- Check the battery state before checking other parts of electrical system. To carry out the accurate electrical system test, the battery must be fully charged.
- Electrical components shall not be beat with hammers or fell on a hard surface. This impact may damage the electrical components.
- To prevent the electrical components from being damaged, do not disconnect the battery leads or any other electrical connection when the ignition switch is on or the engine is running.
- Due to the high current, do not press the start button all the time when the starter motor does not function, otherwise the current may burn out the starter motor coil.
- Be careful not to short-circuit the leads between positive electrode of storage battery and ground wire of frame
- Sometimes a failure may involve an item, and sometimes it may involve many items. Do not replace the defective part until the exact fault cause is found. If the fault is caused by other causes, the repairing or replacement must be carried out immediately, otherwise the newly replaced part will be damaged again easily.
- Make sure that all circuit connectors are clean and tight and check whether there are burnt or wear signs on the wires. The broken wires and poor connection will affect the electrical system operation.
- Measure the coil and winding resistance after the components are cooled (under indoor temperature)

Technical Parameters

Item	Standard
Battery	
Type	Maintenance-free storage battery
Model	YTX7L-BS
Capacity	12 V 6 Ah
Voltage	12V
Charging system	
Type	Three-phase AC
AC generator output voltage	55V or above when it is 5000 r/min (rpm)
Stator coil resistance	0.05-0.5Ω (at normal temperature 20℃)
Charging voltage	14.2 -15.2 V
(Voltage regulator/rectifier output voltage)	
Ignition system	
Crankshaft position sensor resistance	130-170Ω
Ignition coil:	
Primary coil resistance	3.6-4.4Ω
Secondary coil resistance	8.5-11.5kΩ
Primary voltage peak	72 V or above
Spark plug:	
Type	CR8E
spark plug gap	0.6 -0.7 mm
Electric starting system	
Starter motor:	
Carbon brush length	10 mm (service life: 5.0 mm)
Commutator diameter	28 mm (service life: 27 mm)
Meter, gauge, indicating device	
Voltage of speed sensor power	About 12 V
Switch and sensor	
Rear brake light switch timing	ON about 20mm of pedal travel
Engine oil pressure switch connector	Engine stop: ON Engine running: OFF
Fan switch resistance	In the text
Fuel level sensor resistance:	
Full fuel level	9-11 Q
Empty fuel level	213-219 Q

Special Tool

Multimeter:	tester probe:
	

Electrical Wiring

Wiring Inspection

●Visually check the melting, wear and other phenomena of wires.

★If the wire is broken, replace the damaged wire.

●Pull out each connector [A] to check whether there is any corrosion, dirt and damage.

★If the connectors are corroded or soiled, carefully clean them. If the connectors are damaged, replace them.

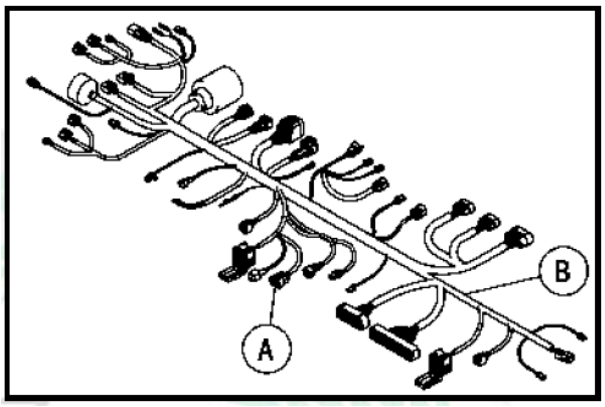
●Check whether the connection of circuit is normal.

○Find the power wire terminal which may have problems by using the wiring diagram.

○Connect the multimeter between the power wire terminals.

Special Tool—Multimeter:

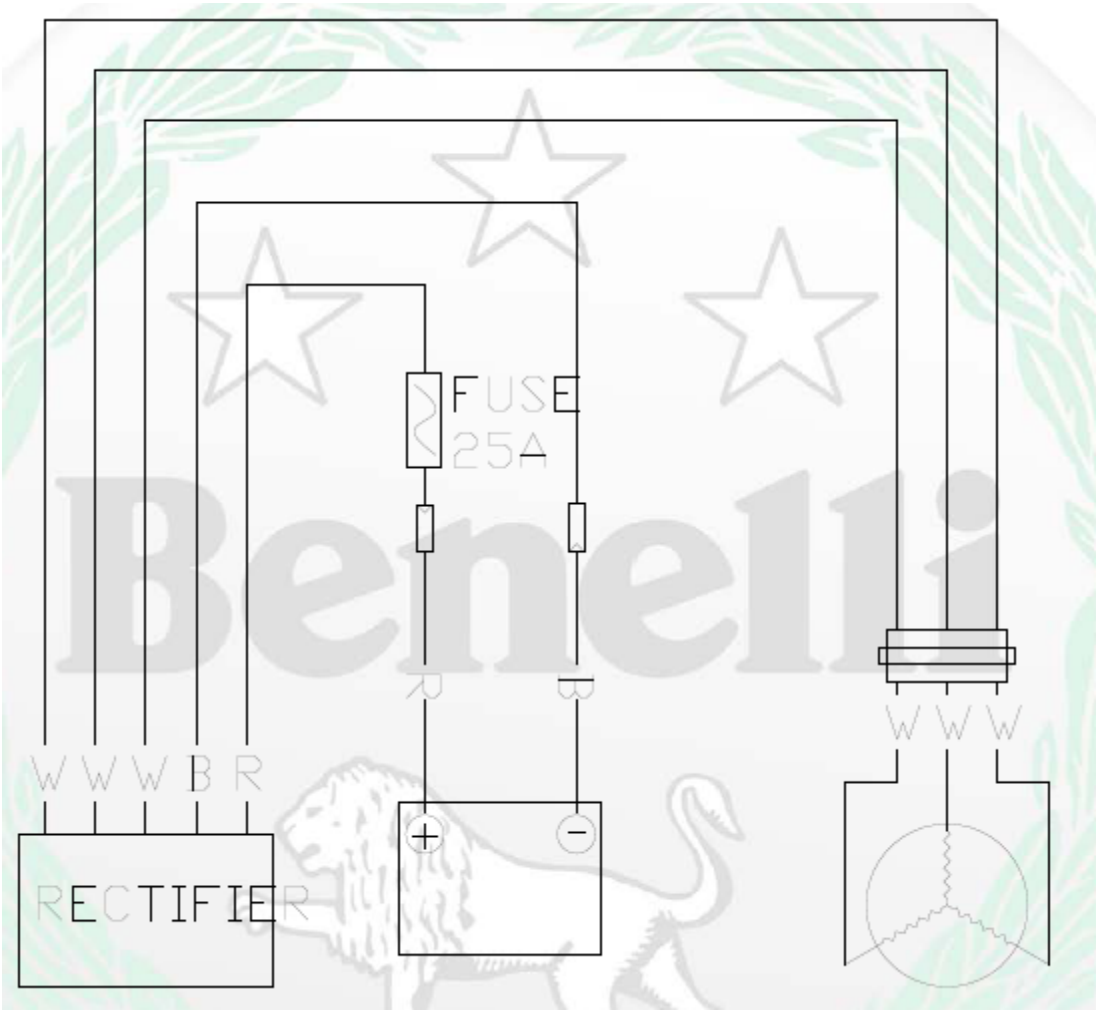
○Set the scope of multimeter as ×1Ω and check the multimeter reading.



★If the multimeter shows “0”, it means some fault of the power wire. If necessary, replace the lead or main cable [B].

Charging System

Charging System Circuit Diagram



Charging System

Battery

Disassembling Battery

● Switch off the power lock

●Disassemble the seat (see “Finished Motorcycle—Seat” chapter)

●Disassemble the right safety guard (see “Finished Motorcycle—Safety Guard” chapter)

●Disconnect the negative terminal of battery

* Note
○*Make sure to disconnect the negative (-) lead first*

● Disconnect the positive terminal of battery

●Remove the storage battery strap

●Remove the battery from the battery fixing bracket

Battery Installation

●Install the battery into the bracket

●Connect the negative (-) lead to the battery

●Apply a thin layer of grease on the terminal to prevent corrosion

●Connect the positive (+) lead to the battery

●Cover the (+) terminal with a red cover [A]

●Install the battery cover on the battery and hook the strap

●Connect the connector

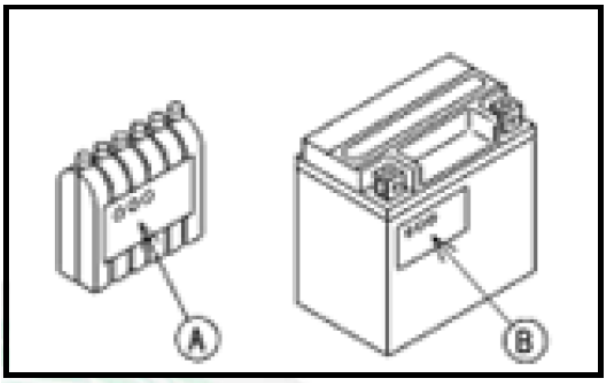
●Connect the negative (-) lead to the frame

●Installing:

Right body cover

Seat

Battery Activation



●Filling Electrolyte

○Make sure that the model [A] marked on the electrolyte bottle matches with the model [B] of the battery. These models must be the same.

Storage battery model: YTX7L-BS

⚠Warning
Make sure to use the electrolyte of the model same as that marked on the storage battery, because the volume and density of used electrolyte are different if the storage battery models are different. This is to prevent excessive filling the electrolyte that shorten the life of battery and reduce its performance

⚠Warning
Do not tear the aluminum sealing fin [A] of the filling port [B] before use. Make sure to use the special electrolyte storage container to guarantee that suitable volume of the electrolyte is filled

○Place the battery on-a horizontal plane

○Check whether there are peeling, crack or hole on the sealing fin

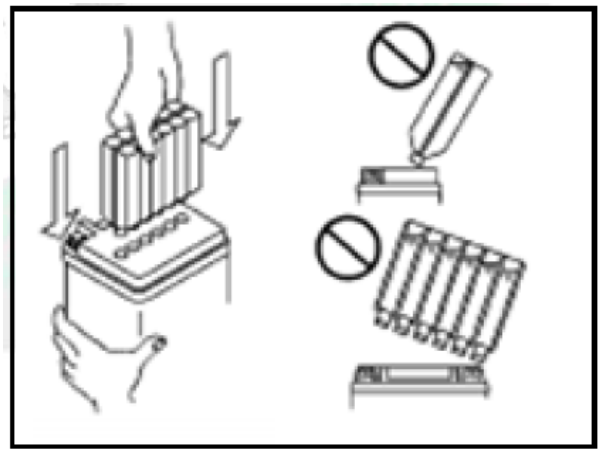
○Disassemble the sealing strip

* Note
○*The battery is vacuum sealed. If the sealing fin enables the air to enter into the battery, the first charging time may be longer.*

●Remove the electrolyte bottle from the plastic bag

●Remove the strip covers [A] from the container, place them aside and then use them to seal the battery.

*Note
○*Do not puncture or open the sealing layer [B] of electrolyte bottle. Do not attempt to separate the individual liquid storage chambers.*



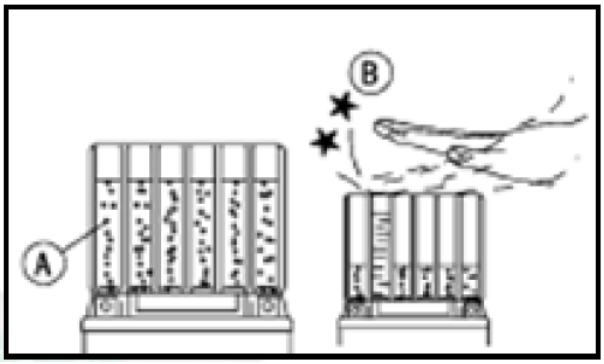
●Topple the electrolyte bottle and put six sealing grooves in the filling port of battery. Keep the electrolyte bottle level and push it down to puncture the sealing of all six liquid storage chambers. As the sealed liquid storage chambers are inserted into the filling port, you will see that there will be rising bubbles in the liquid storage chambers.

*Note
○*Do not tilt the electrolyte bottle*

●Check the electrolyte flow

★If there are no rising bubbles in the filling port [A], or if the electrolyte is not completely injected into the storage battery, slightly tap the electrolyte bottle [B] several times.

●Keep the electrolyte bottle at this position for 20 minutes or above. Do not remove the container from the battery before it becomes empty, because all the electrolyte in the container is required for normal operation of battery.



⚠Warning
If the electrolyte in the electrolyte bottle is not injected into the storage battery completely, the service life of storage battery may be shortened. In order to inject the electrolyte into the battery completely, usually need 20 minutes at least, so do not remove the electrolyte bottle in advance.

●Remove the electrolyte bottle from the battery gently

●Let the battery stand for 60 minutes before charging, to enable the electrolyte to permeate into the metal plate so as to reach the optimum performance.

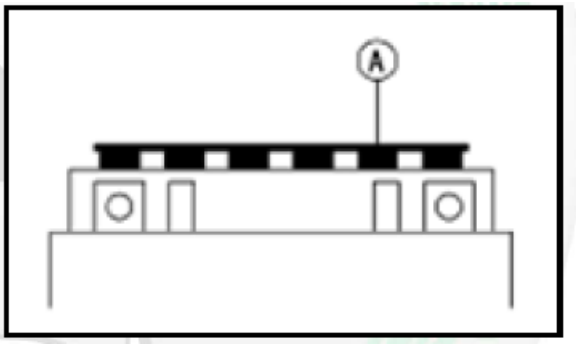
***Note**
○*If using the battery immediatelely after filling, the battery life will be shortened. Enable it to stand for at least 60 minutes after filling.*

Initial Charge

●Gently put the strap [A] cover on the filling port and do not press it in completely

●Always initial charge for the newly activated maintenance-free storage battery

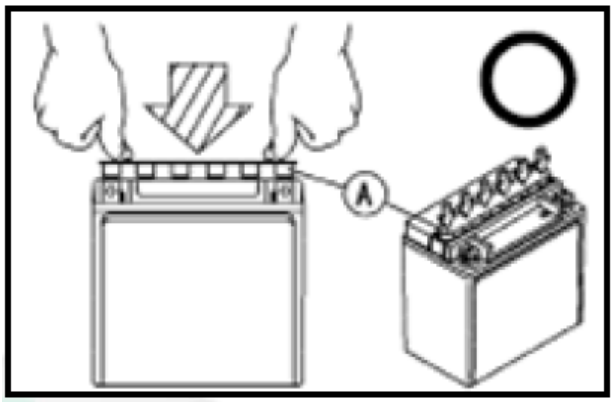
Standard charge : 0.9A × 5-10 hours



***Note**
○*The charging rate depends on the battery storage time and temperature and the type of used charger* ○*After the initial charge, let the battery stand for 30 minutes, and then check the voltage with a voltmeter.*

If the voltage does not reach at least 12.6V, repeat the charging cycle.

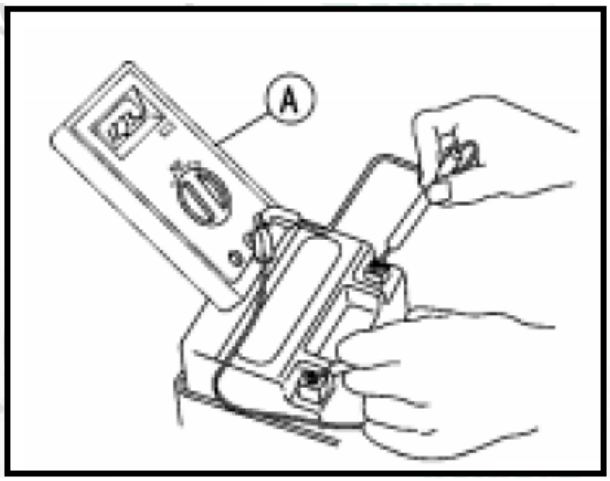
●After the charging is completed, vigorously press the strap cover [A] with both hands to make it enter into the battery (do not thump or beat it). After it is installed properly, the strap cover and the top of battery will be parallel.



Warning
Once the strip cover is inserted into the battery, do not remove the cover and do not add water or electrolyte to the battery.

***Note**
○*To ensure the maximum battery life and higher customer satisfaction, it is recommended to carry out a load test of 15 seconds for the battery at three times the ampere-hour rate of battery. Recheck the voltage and repeat the charging cycle and load test if the voltage is less than 12.6V. If the voltage is still below 12.6V, the battery is defective.*

Charging State Inspection



●The battery can be checked by measuring the battery terminal voltage with a voltmeter [A].

●Disassemble the battery

●Measure the battery terminal voltage

***Note**
○*Use a digital voltmeter which can read a decimal place to measure the voltage*

●If the reading is 12.6V or higher, no additional energy is required; however, if the reading is below the specified value, the power needs to be supplemented.

The terminal voltage and charging method are shown in the table below

Terminal voltage	Charging method
11.5-12.6V	0.9A × 5-10h
Less than 11.5V	0.9A × 20h

●After fully recharging the battery, let the battery stand for 30 minutes and then judge the battery state by measuring the terminal voltage according to the following table.

Standard	**Judgement**
12.6V or above	Good
12.0-12.6V (less than 12.6 V)	Undercharge→Repeated charging
Less than 12.0V	Unavailable→Replacement

●During inspection, the battery shall be tested with a multimeter under the complete charging state.

●Install the fully charged battery after the engine warm up.

●Connect the voltmeter with the terminals of battery.

●Start the engine and increase the speed slowly to measure the limiting voltage.

Limiting voltage/speed: 15V (5000rpm) (DCV range)

●Check the voltage regulator if the limiting voltage is not within the range of specified value.

Magneto

*Note
○*The charging coil of magneto can be checked on the engine.*

Magneto Disassembly

●Disconnect the magneto lead couplers

●Put a suitable container below the magneto cover

●Loosen the magneto cover mounting bolt and remove the magneto cover and coil

●Pull out the magneto lead between the engine and bracket

●Stator coil disassembly:

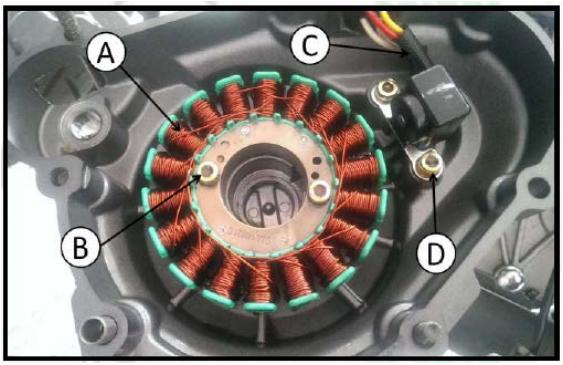
Magneto cover (see the magneto cover disassembly section)

Stator coil [A]

Stator coil mounting bolt [B]

Magneto lead rubber cover [C]

Bracket and bracket bolt [D]



●Flywheel disassembly:

Disassemble the magneto cover (see the magneto cover disassembly section)

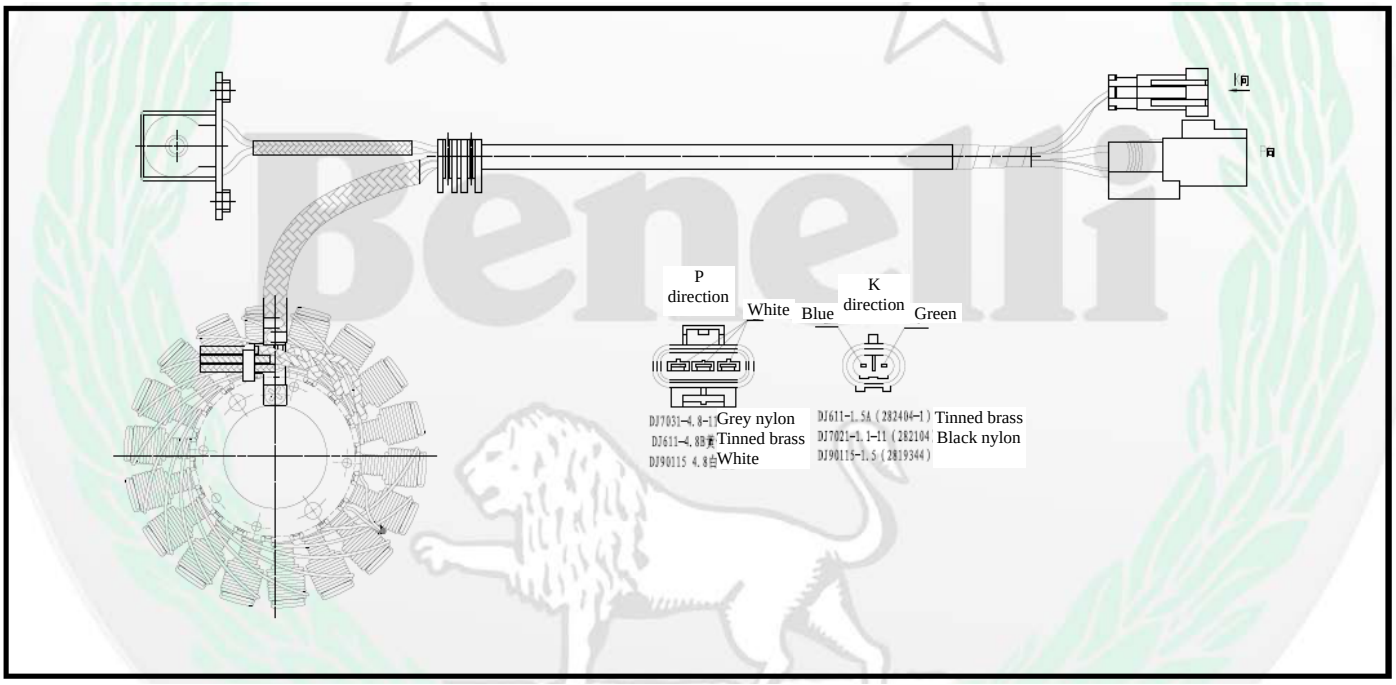
Use the flywheel puller to remove the flywheel mounting bolt.

Disassemble the flywheel from the crankshaft with the flywheel puller

●Remove the flywheel

Magneto Inspection

●There are three types of magneto faults: short circuit, open circuit (the coil is burnt) or magnetic loss of rotor. A short or open circuit of coil will result in low output or even no output. The magnetic loss of rotor will result in low output, this loss may be caused by the dropping or beating suffered of the AC generator, or it may also caused by placing it near the electromagnetic field, or due to the aging only.



●Turn off the ignition switch

●Remove the 3 pins coupler of magneto.

●Measure the resistances among three black terminals of magneto with a multimeter.

Standard value: 0.05-0.5Ω (normal temperature 20℃)

★If the resistance value is higher than specification, or if there are no readings (infinite values) on random two pins , the stator circuit is open and must be replaced. If the resistance value is far below this specification, it means that the stator is short-circuited and must be replaced.

●Use the maximum resistance range of multimeter to measure the resistance between each black lead and chassis ground.

★ If use a tester to test whether there is a breakover between the coil and the engine body; if there is a breakover, it means the engine and coil are short circuit and the charge coil needs to be checked.

★If the resistance of stator coil is normal, but it shows that there are faults on the magneto after voltage inspection, it is possible that the rotor magnetism is reduced and the rotor must be replaced at this time.

●Start the engine

○Operate the engine according to the revolutions per minute (rpm) given by the Table 1

○Record the voltage readings (3 measurement values in total)

Table 1 Magneto Output Voltage

Range of tester	Wiring		Readings when it is 5000rpm
	Connect tester (+) to	Connect tester (-) to	
750 V AC	A black power wire	The other black power wire	55V or higher

★If the displayed output voltage value is the value in the table, it indicates that the magneto runs normally.

★If the reading is much lower than the value in the table, it indicates that there are faults with the magneto.

Magneto Installation

● reverse the removal procedure for installation

Fastening torque of stator coil mounting bolt: 10 N·m

Fastening torque of bracket bolt: 8-10 N·m

Fastening torque of magneto cover bolt: 8-10 N·m

Fastening torque of flywheel mounting bolt:90-100 N·m

Voltage Regulator/Rectifier

Rectifier Disassembly:

●Disassembling:

coupler

Bolt

Voltage regulator/rectifier

Main Wiring Terminal Circuit Inspection

●Remove the motorcycle body safety guard.

●Remove the 3 pins plug of the regulator/rectifier and check the breakover among main wiring terminals in the following method.

Rectifier Inspection

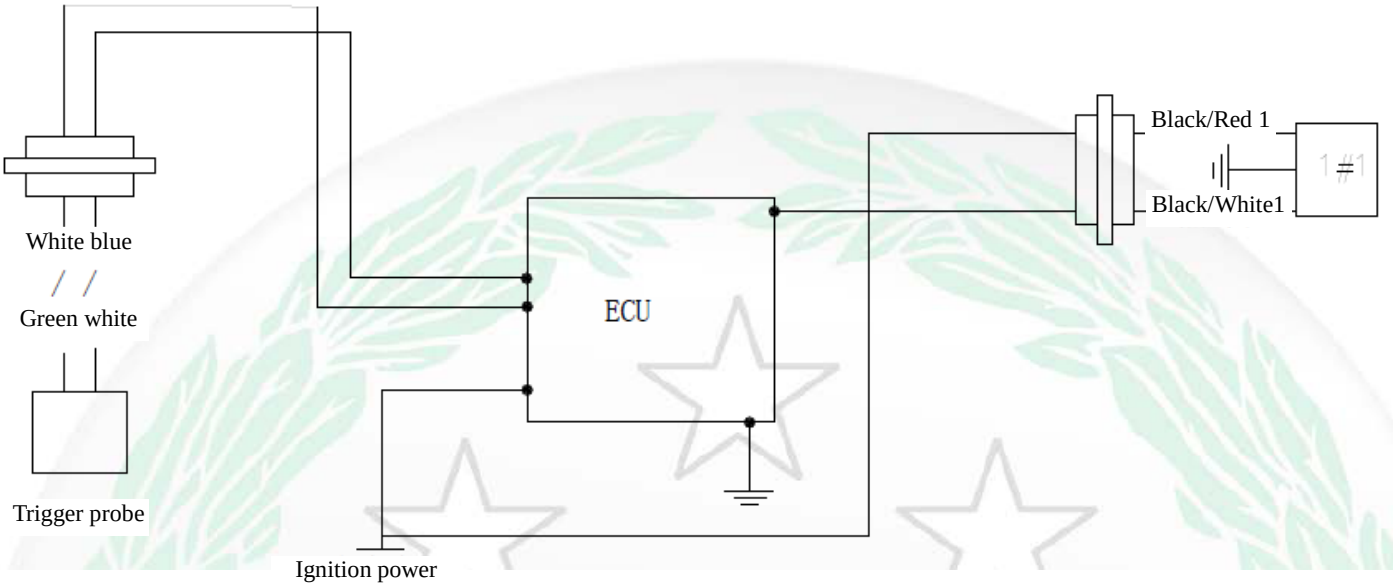
1. Multimeter: select the diode gear;
2. Connect the negative probe to the red lead terminal of regulator and connect the positive probe to the yellow lead terminals of regulator (yellow 1, yellow 2, yellow 3); the multimeter should shows a certain value (range of 0.1-0.5V), otherwise it indicates that the r regulator is damaged and needs to be replaced.
3. Connect the positive probe to the green lead terminal at the regulator and connect the negative probe to the yellow lead terminals of regulator (yellow 1, yellow 2, yellow 3); the multimeter should shows a certain value (range of 0.3-0.8V), otherwise it indicates that the regulator is damaged and needs to be replaced.

Rectifier Installation:

● reverse the removal procedure for installation

Ignition System

Ignition System Circuit Diagram



Ignition system

Operation Precautions

1. Check the ignition system in accordance with the order of fault diagnosis table step by step.
2. The ignition system is the electronic automatic angle feeding device and has been cured in the ECU group, so the ignition time does not need to be adjusted.
4. Most of ignition system faults are caused by the poor contact of connector, so check whether the contact of various connector parts is poor first.
5. Check whether the heat value of the spark plug is appropriate, inappropriate spark plug will cause the unsmooth running of engine or make the spark plug be burned out.
6. Check the main switch in accordance with the breakover table of switch section. (Attached)
7. Please disassemble the magneto and stator according to the disassembly description.

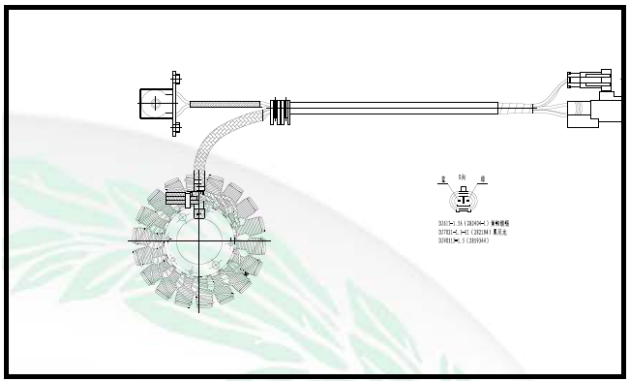
Warning
The ignition system will generate extremely high voltage. Do not touch the spark plug or coil when the engine is running, otherwise you may suffer a severe electric shock.

***Note**
Do not disconnect the battery connecting wire or any other electrical connection when the ignition switch is on or when the engine is running. This is to prevent from damaging the ECU. Do not install the battery reversely. The negative electrode terminal shall be grounded. This is to prevent from damaging the ECU.

Crankshaft Sensor

Crankshaft Position Sensor Disassembly

●Integrated with the magneto, it cannot be disassembled separately



●Use the tester

*Note
The trigger can be checked on the engine.

Checking

● Disconnect the trigger lead coupler.

●Measure the resistance of red and yellow engine leads.

Standard value: 150±20Ω (20℃)

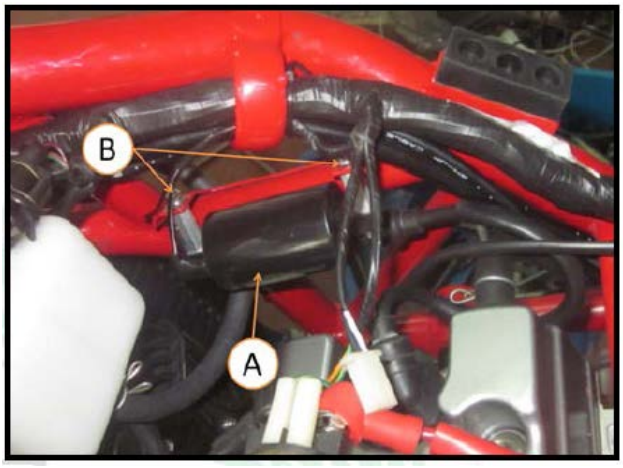
★If the measured resistance value is higher than the specified value, the coil circuit is disconnected and needs to be replaced.

★If the resistance value is lower than the specified value, the coil is short-circuited and must be replaced.

Ignition Coil

Ignition Coil Disassembly:

●Remove the ignition coil [A] mounting bolts [B] which under the fuel tank and disconnect the connector.



Ignition Coil Inspection

*Note
• If the spark plug does not generate sparks, check whether the wiring parts are loose or poor contact, • Because of many brands of multimeter and their internal impedances are different, the test values are different.

●Check the primary coil

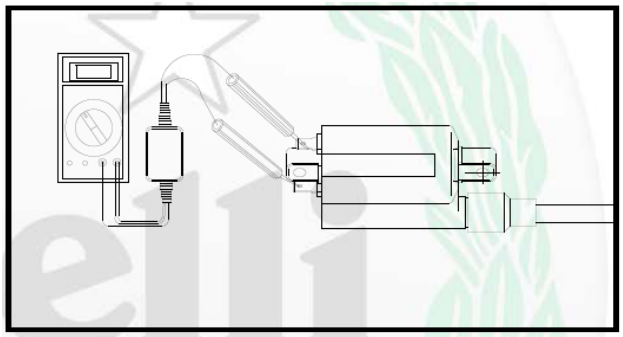
●Measure the impedance among the terminals of primary coil.

Standard value: (4±0.4)Ω (20℃)

★The impedance value is good if within specification

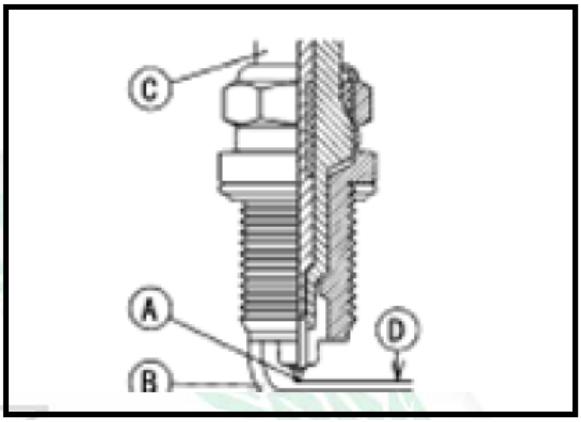
.

★If the impedance value is "∞", it indicates that the wire in the coil is disconnected and the ignition coil needs to be replaced.



Spark Plug

Spark Plug condition Inspection



●Disassemble the spark plug (see the spark plug disassembly section)

●Visually check the spark plug

○If the central electrode [A] and/or side electrode [B] of spark plug is/are corroded or damaged, or the insulator terminal [C] is broken, replace the spark plug

★If the spark plug is dirty or there are carbon deposits on the spark plug, replace the spark plug

○Measure the gap [D] with a wire gauge

○If the clearance is incorrect, replace the spark plug

standard spark plug gap: 0.6-0.7 mm

○Use the standard spark plugs or spark plugs in the same grade

Spark plug type: CR8E

Checking

●Start the engine according to the following conditions

First Checking

Condition:

Drive device → shift to first gear

Clutch handle → apply

Side stand → up

○Turn on the ignition switch and press the start button

○If the start-up system circuit is normal, the starter motor will not rotate

●If the engine starts, check the starter lockout switch, side stand switch , gear switch and relay box

●If the parts are all in good condition, replace the ECU • then start the engine according to the following conditions

Second Checking

Condition:

Gear → neutral

Clutch handle → release

Side stand → down

○Turn on the ignition switch and press the start button

○Then the starter motor starts if the start-up system circuit is normal

★If the starter motor does not start, check the start switch, gear switch and relay box

★If the parts are all in good condition, replace the electronic control unit

Third Checking

●After carrying out the following operations, check whether the engine can be safely stopped

●Run the engine according to the following conditions

Condition:

Gear → first gear

Clutch handle → release

Side stand → up

●If drop the side stand , the engine will flame out

★If any one does not flame out, check the gear switch, start switch, side stand switch and relay box

★If the parts are all in good condition, replace the electronic control unit

IC Igniter Inspection

○IC igniter is put inside the electronic control unit.

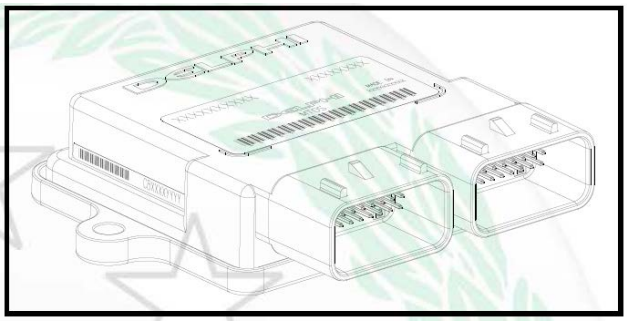
●Refer to the following items

1. Electrical start-up safety circuit-related components operation inspection (see the electrical start-up safety circuit-related components operation checking section)
2. Ignition system troubleshooting (see the ignition system section)
3. Electronic control unit voltage inspection (see the electronic control unit power inspection section in the chapter of electronic fuel injection system (ECU))

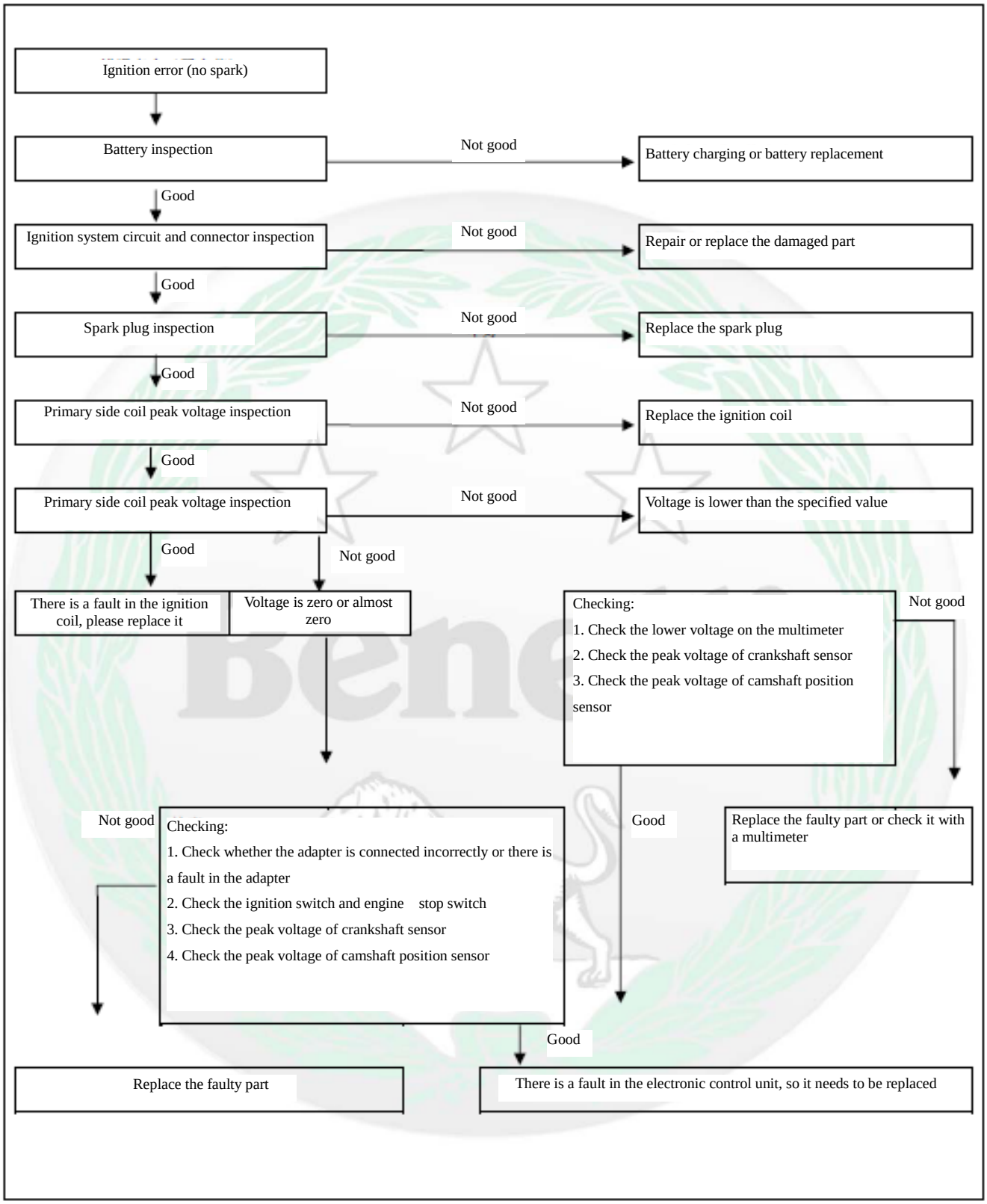
ECU

●System inspection

●Remove the ECU and check the parts related to the ignition system at the connector terminal of wire hardness side. (See the electronic fuel injection system, ECU section)

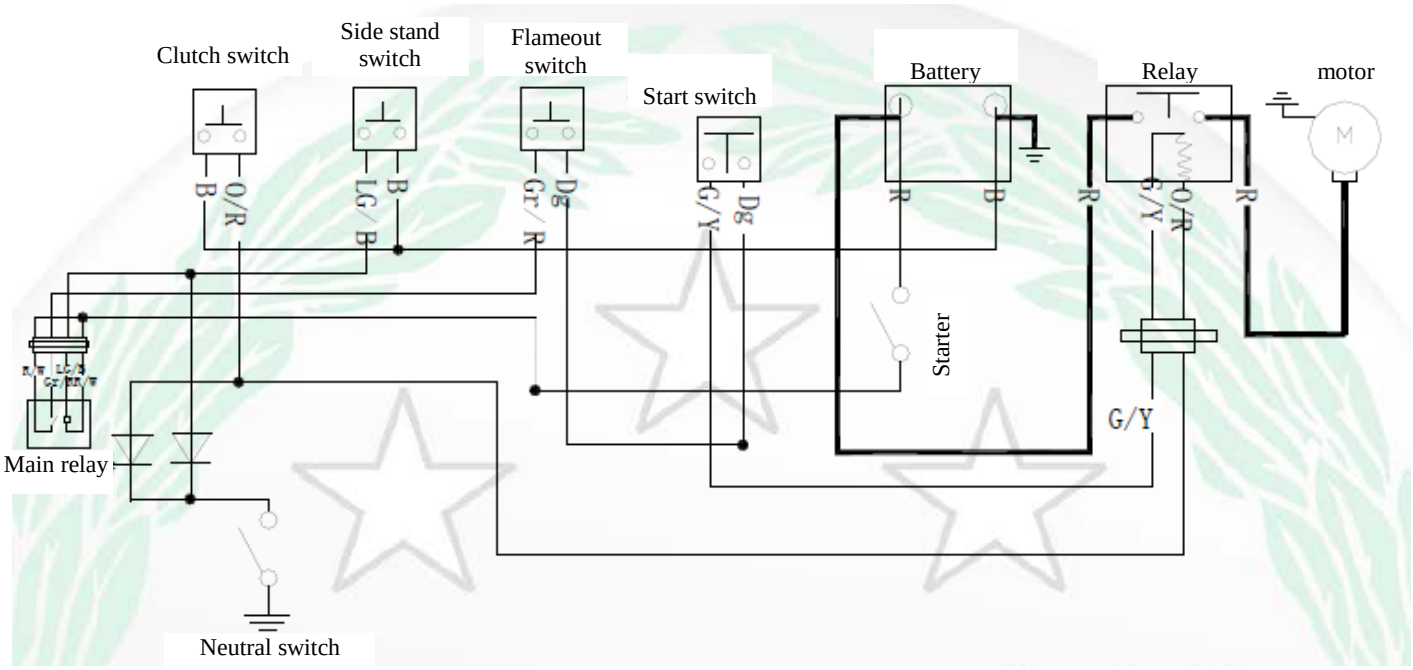


Ignition System Troubleshooting


Ignition error (no spark)
Battery inspection
Not good
Battery charging or battery replacement
Good
Ignition system circuit and connector inspection
Not good
Repair or replace the damaged part
Good
Spark plug inspection
Not good
Replace the spark plug
Good
Primary side coil peak voltage inspection
Not good
Replace the ignition coil
Good
Primary side coil peak voltage inspection
Not good
Voltage is lower than the specified value
Good
Not good
There is a fault in the ignition coil, please replace it
Voltage is zero or almost zero
Checking:
1. Check the lower voltage on the multimeter
2. Check the peak voltage of crankshaft sensor
3. Check the peak voltage of camshaft position sensor
Not good
Not good
Checking:
1. Check whether the adapter is connected incorrectly or there is a fault in the adapter
2. Check the ignition switch and engine stop switch
3. Check the peak voltage of crankshaft sensor
4. Check the peak voltage of camshaft position sensor
Good
Replace the faulty part or check it with a multimeter
Good
Replace the faulty part
There is a fault in the electronic control unit, so it needs to be replaced

Starting System

Starting System Circuit Diagram



starting schematic Diagram

Starter Motor

*Note
Before the starter motor is disassembled, turn "OFF" the main switch, remove the bond strap of battery, and then turn on the power to see whether the motor runs to confirm safety.

*Note
Do not pat the starter motor shaft or body, otherwise the motor body may be damaged

Starter Motor Disassembly

●Disassemble the starter motor lead terminal nut

●Disassemble the starter motor mounting bolt

● Remove the starter motor from the left side

Starter Motor Inspection

Start the engine according to the following conditions

Condition:

Gear → neutral

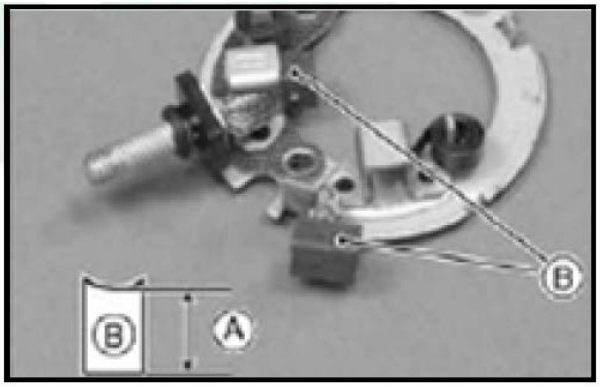
Clutch handle → release

Side stand → down

●Turn on the ignition switch and press the start button

○If other starting system circuits are normal, but the starter motor does not start. Remove the starter motor and directly connect it to the positive and negative electrodes of storage battery; if it can run normally, it is the engine Matching problem: if it does not run, the starter motor is broken.

Carbon Brush Inspection



●Measure the length [A] of each carbon brush [B]

★If any carbon brush has reached the service limit, replace the carbon brush plate assembly as a set.

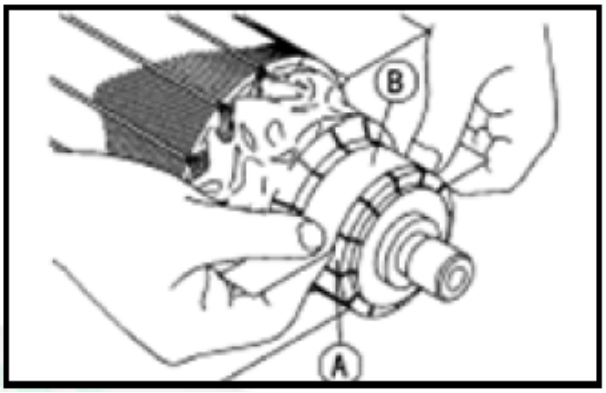
Length of Starter Motor Carbon Brush

Standard: 10 mm

Service limit: 5.0 mm

Commutator Cleaning and Inspection

●If necessary, polish the surface [A] of commutator with a crocus cloth [B] and clean the groove



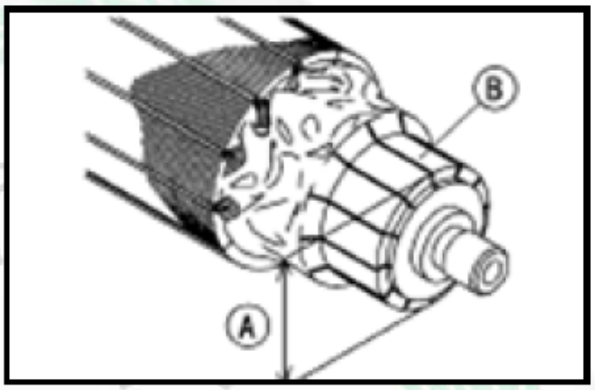
●Measure the diameter [A] of commutator [B]

★If the diameter of commutator is shorter than the service limit, replace the starter motor with a new one

Commutator Diameter

Standard: 28mm

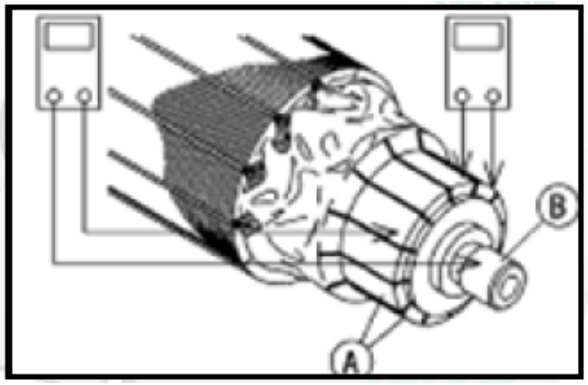
Service limit: 27mm



★If the resistance between two commutators is higher or there is no reading, the coil is open-circuit and the starter motor must be replaced.

●Measure the resistance between commutator [A] and shaft [B] with a multimeter

★If the reading is 0, the armature is short-circuited and the starter motor must be replaced

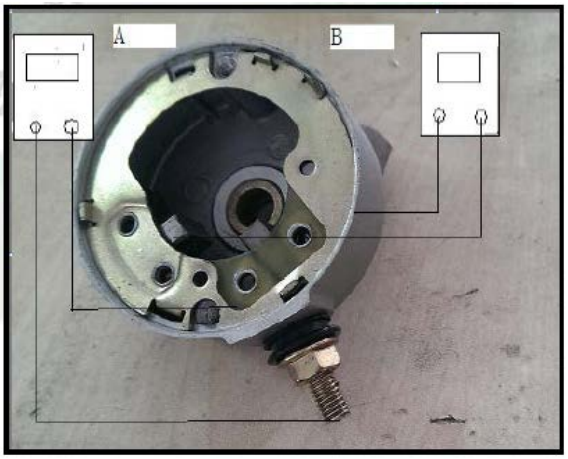


Carbon Brush Leads Inspection

●Measure the resistance by using a multimeter with the range set as × 1Ω, as shown in the figure

End bolt and positive carbon brush [A]

Start motor front cover and negative carbon brush [B]



★If the resistance is not close to 0Ω, the carbon brush lead is open-circuit. The carbon brush plate assembly needs to be replaced

Start Motor Front Cover Assembly Inspection

●Measure the resistance by using a multimeter with the range set as the maximum, as shown in the figure

Terminal and start mtor front cover [A]

★If there is any reading, the start mtor front cover assembly is short-circuited. Replace the start mtor front cover assembly

Starter Relay

Starter Relay Disassembly and Action Inspection

●Disconnect the starter motor lead and battery negative electrode (-) lead end terminal [C] from the starter relay

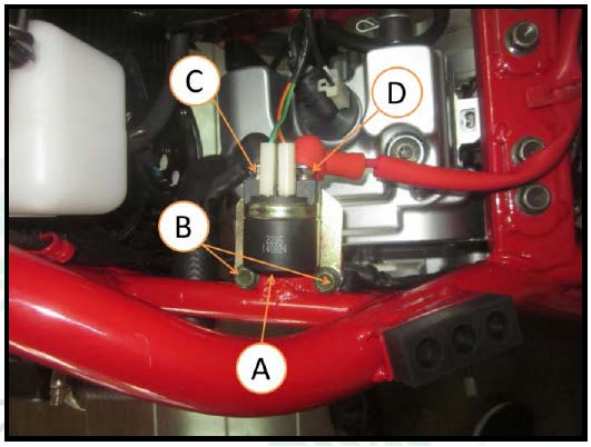
●Disconnect the starter motor lead and battery positive electrode (+) lead end terminal [D] from the starter relay

● Remove the starter relay cable connector

●Removing:

Bolt [B]

Starter relay [A]



●Connect the multimeter and 12V battery to the starter relay, as shown in the figure

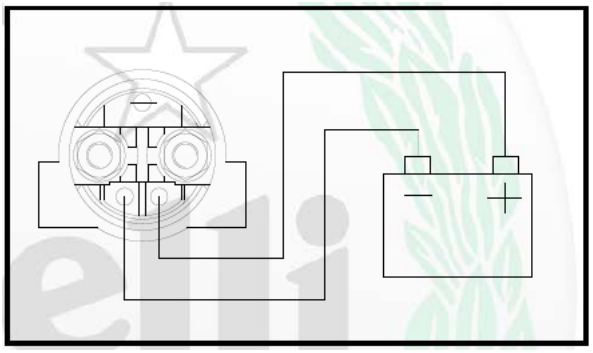
●If the relay does not work as specified, there is a fault in the relay and it needs to be replaced

Testing Relay

Range of tester: × 1Ω range

Standard: when battery is connected→ 0Ω

When the battery is disconnected→ ∞Ω



●Installing:

Torque of starter relay fastening bolt: 8 N·m

Lighting System

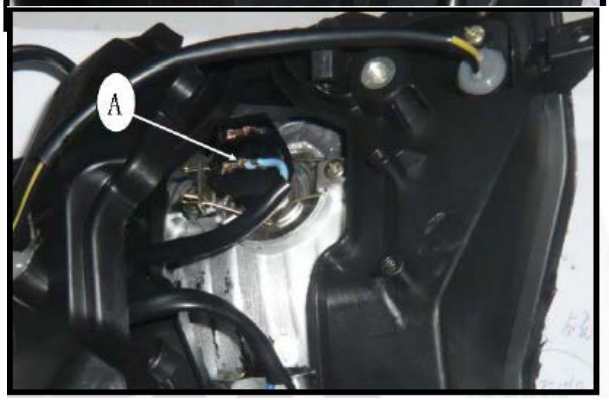
Headlight

Disassemble the headlight (see “Frame-Fairing Disassembly”)

Headlight Bulb Replacement

●Disassemble the rear housing and remove 4 fixing screws [A]

●Disconnect the headlight bulb connector [A]



●Loosen the headlight bulb fixing circlip [A]

●Remove the bulb from its mounting position after the bulb is cooled [A]

⚠Warning
When managing the quartz-halogen bulb, do not touch the glass bulb directly with your hands. A clean cloth must be used. The dirts on hands or dirty cloth may reduce the service life of bulb even cause the bulb explosion.

*Note
○*Use the alcohol or solvent of soap and water to clean the oil stains which accidentally remain on the surface of bulb*

●Replace the headlight bulb

●Place the bulb at the installation position properly and stably

●Install the fixing circlip in place to make the bulb stable

●Connect the headlight bulb joint and install the rear fixing housing

●After the installation, adjust the head lamp concentration (see the head lamp concentration inspection section in the chapter of regular maintenance)

○Other bulbs: repeat the above operations

Front City Light Bulb Replacement

● Remove the bulb socket[A] and bulb together

● Remove the bulb [A] from the bulb socket [B] directly

⚠Warning

Do not rotate the bulb. Directly pull out the bulb to prevent from damaging the bulb. The wattage of the used bulb shall not higher than the specified value

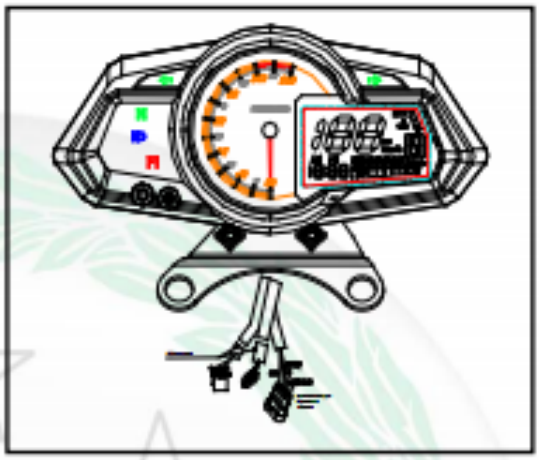
●Replace the bulb with a new one

●Insert the bulb into the city light bulb socket

●Press the bulb socket into the installing hole in place directly and stably

Instrument

Instrument Disassembly



●Remove the fixing nut at the top of headlight by using a Allen wrench

●Remove the instrument fixing bracket mounting plate (inside the head cover) by using a socket wrench

●Separate the instrument bracket and mounting plate by using a socket wrench

●Remove the fairing in the front of instrument by using a screwdriver

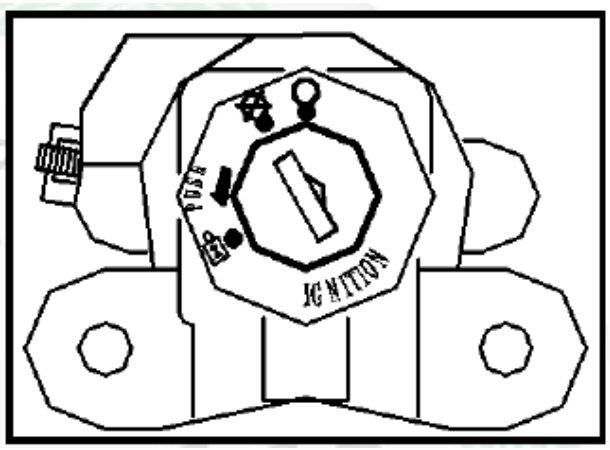
Switch, Sensor and Other Parts

Main Switch

Main Switch Disassembly

●Remove the fairing.

● Disconnect the main switch lead connector.



Main Switch Inspection

●Check the breakover of connector terminal.

★If the breakover does not consistent with the breakover table, please replace the main switch

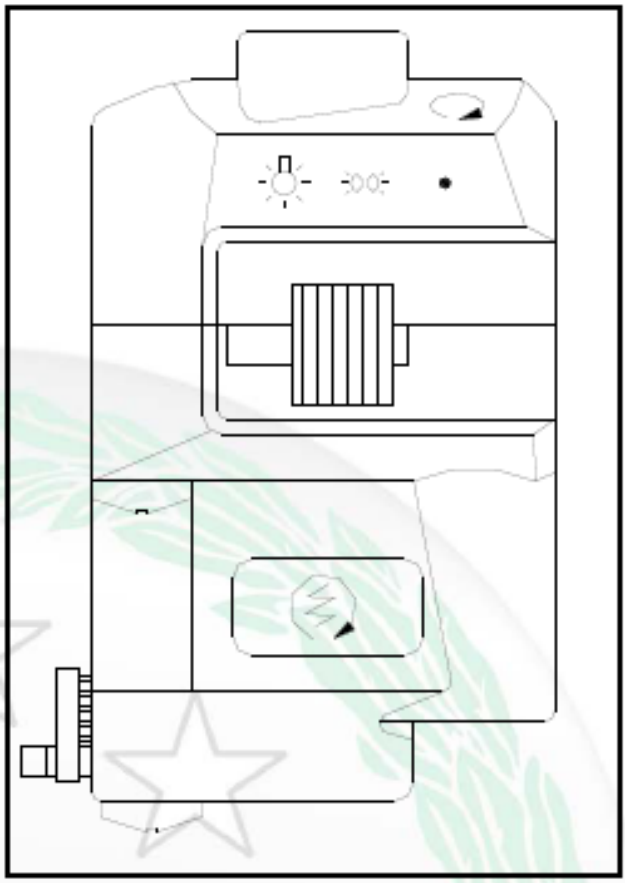
Wiring principle diagram

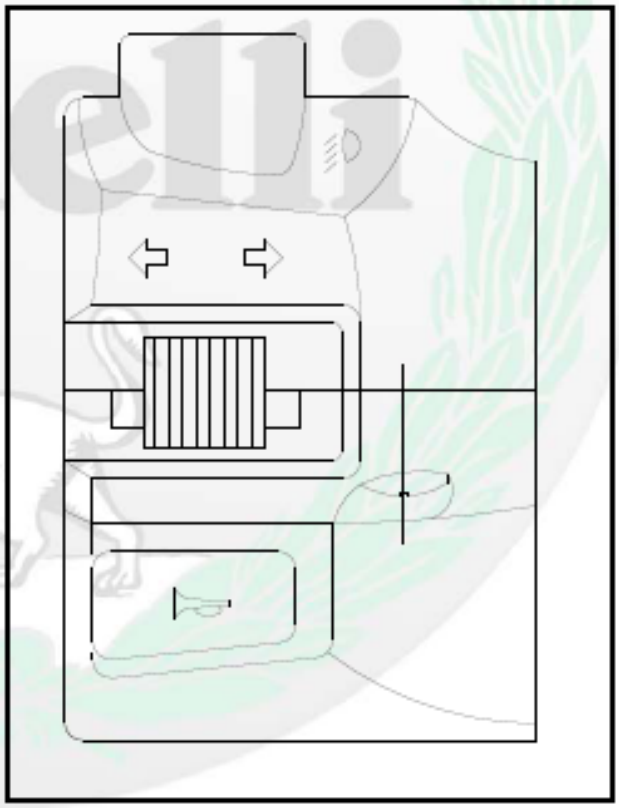
Wire color / Gear	Red	Red/White

Handle Switch

Switch State 1

1. Dimmer switch
2. Turn signal switch
3. Horn switch
4. headlight control switch
5. Engine stop switch
6. Start switch
7. Passing button



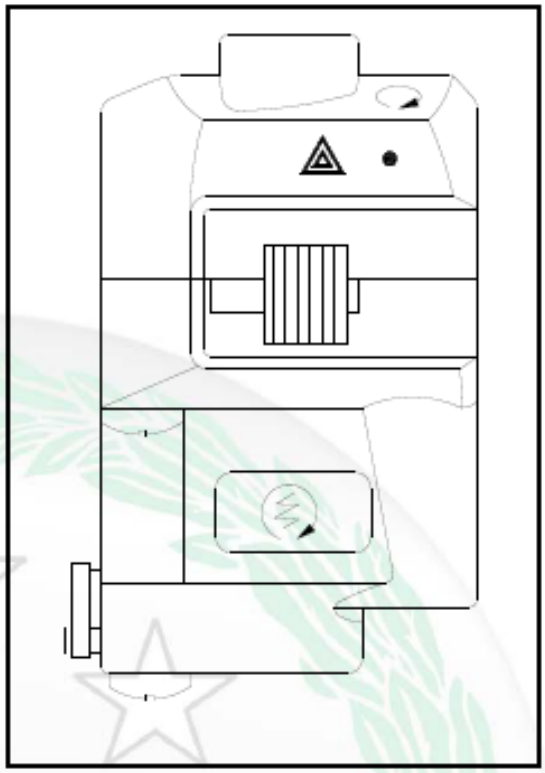


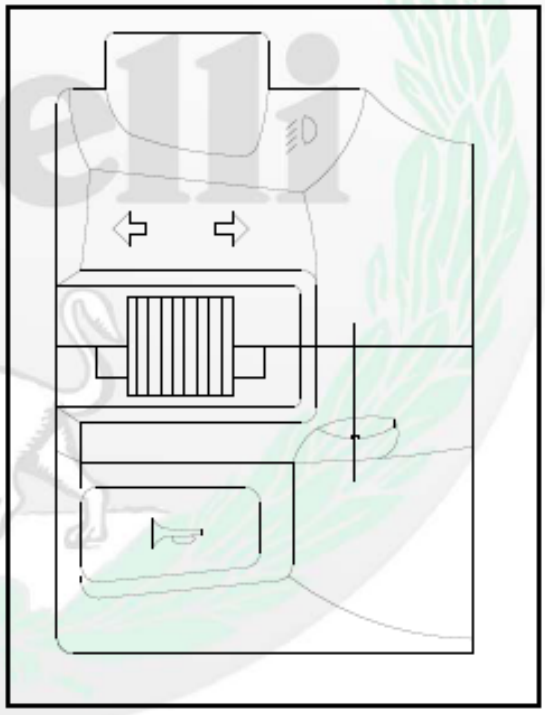
	Red/ White	Orange/ Blue	Yellow/ Red		Dark green	Green/ Yellow		Dark green	Red

Dimmer switch					~~Steering~~ Turn signal switch				Horn switch		
	Blue	Yellow /Red	Light blue	Red/ White		Green /Black	Black	Green/ White		Red/ White	Brown
PASS											

Switch State 2 (Automatic Headlight On)

1. Dimmer switch
2. Turn signal switch
3. Horn switch
4. Warning indicator switch
5. Emergency off switch
6. Start switch
7. Passing button





	Green white	Orange	Green black			~~Flameout~~ Emergency off switch			
							Red	Dark green	Start switch
									Green yellow / Dark green

Dimmer switch					~~Steering~~ Turn signal switch				Horn switch		
	Blue	Yellow /Red	Light blue	Red/ White		Green /Black	Black	Green/ White		Red/ White	Brown
PASS											

Brake Lamp　LightingTime Inspection

• See the brake lamp switch operation inspection section in the chapter of regular maintenance

Brake Lamp Lighting Time Adjustment

• See the brake lamp switch operation inspection section in the chapter of regular maintenance

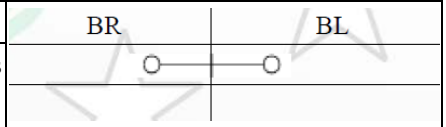
Switch Inspection

• Check whether only the connection in the table is connected by using a handheld multimeter

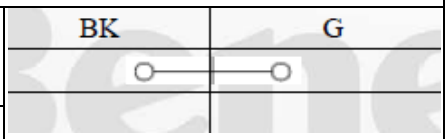
○For the switch housing and main switch, see the table in the circuit diagram section

★If the switch is open-circuited or short circuited, repair it or replace it with a new one

Rear Brake Lamp Switch Connection

Rear brake lamp switch connection	
Color	
When the brake lever or pedal is pressed	
When the brake lever or pedal is released	

Side Stand Switch Connection

Side Stand switch connection	
Color	
When the side stand is down	
When the side stand is up	

Speed Sensor

Speed Sensor Disassembly

⚠Warning

Do not make the sensor drop especially on the hard surface.
The impact shock may damage the sensor

●Loosen the bolt

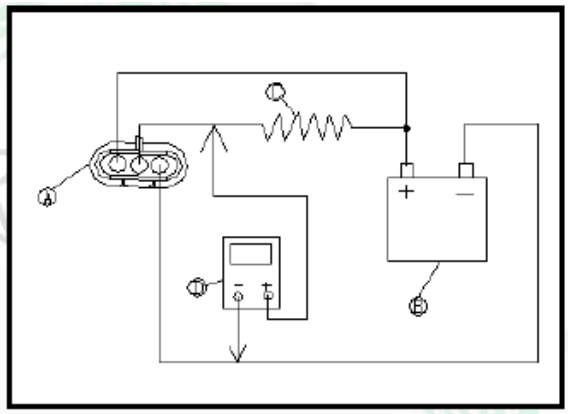
●Disconnect the speed sensor coupler

Speed Sensor Inspection

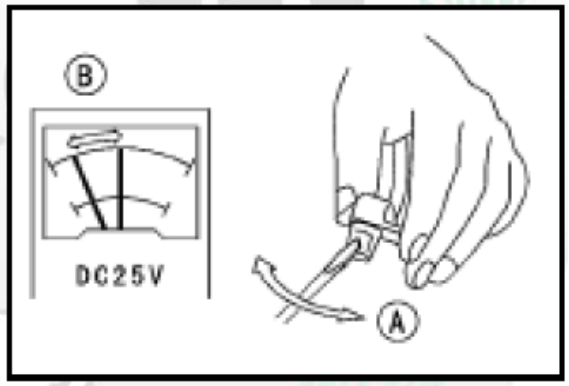
●Disassemble the speed sensor (see the speed sensor disassembly section)

●Connect the speed sensor coupler [A], battery [B], 10kΩ resistor [C] and hand-held multimeter [D] together, as shown in the figure

●Set the range of multimeter to DC 20V (digital multimeter)



●When a screwdriver is glided across the speed sensor induction surface, it is normal that the voltage is adjusted from the storage battery voltage to about 0-1V



Oxygen Sensor

Oxygen Sensor Disassembly

Warning

Do not make the sensor drop especially on the hard surface. The impact shock may damage the sensor

●Disassembling:

Right lower fairing (see the lower fairing disassembly section in the chapter of frame)

Oxygen sensor coupler [A] (disconnected)

Clamp [B] (open)

Oxygen sensor [C]

Oxygen Sensor Installation

Warning

Do not make the oxygen sensor [A] drop especially on the hard surface. The impact shock may damage the sensor. Do not touch the sensing part [B] of sensor to prevent from being stained. The stains on the hands may affect the sensor performance.

●Tightening:

Torque—oxygen sensor: 25 N·m

●Correctly routing the oxygen sensor cable (see the cable, wire and hose winding section in the chapter of accessory)

Oxygen Sensor Inspection

●See the oxygen sensor inspection section in the chapter of fuel system (EFI)

Fuel Level Sensor

Fuel Level Sensor Disassembly

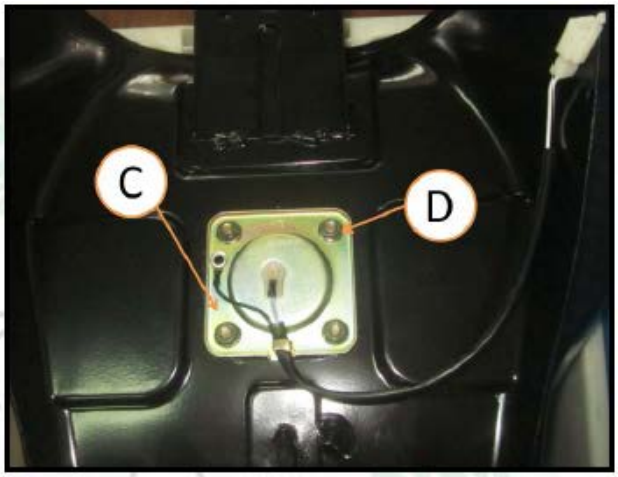
• Disassembling:

Fuel tank (see the fuel tank disassembly section in the chapter of fuel system (EFI)

Disassembling:

Nuts [D]

Fuel level sensor [C]



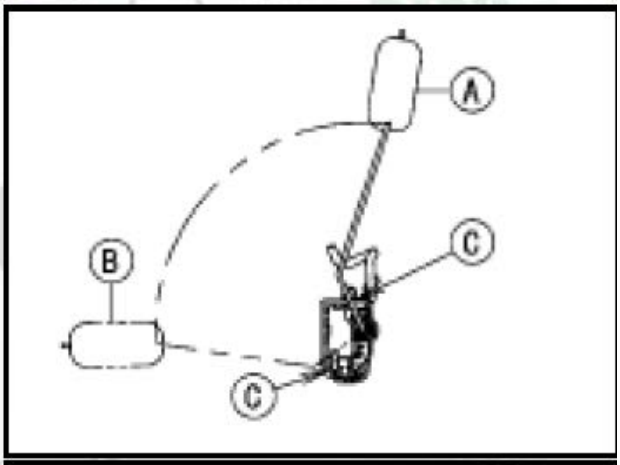
• Check whether the fuel sensor floater moves smoothly without clamping stagnation. It shall move down under the effect of its own gravity

★ If the floater cannot move smoothly, replace the sensor

When the floater is full [A]

When the floater is empty [B]

Floater arm stopper [C]



• Use the handheld multimeter [A] to measure the resistance around the fuel level sensor coupler [B] terminal

Special Tool—Handheld Multimeter:

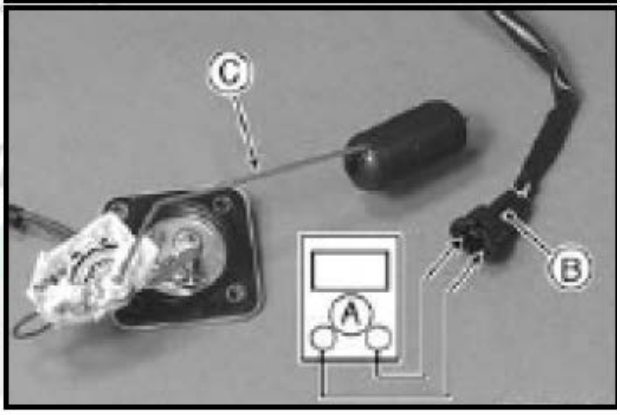
Pointer Adapter Device:

If the multimeter reading does not meet the specifications or the reading does not change smoothly with the up and down movement of float block, replace the sensor

Fuel Level Sensor Resistance

Standard: full fuel level [C]: 5-12Ω

Empty fuel level: 96-103Ω



Horn

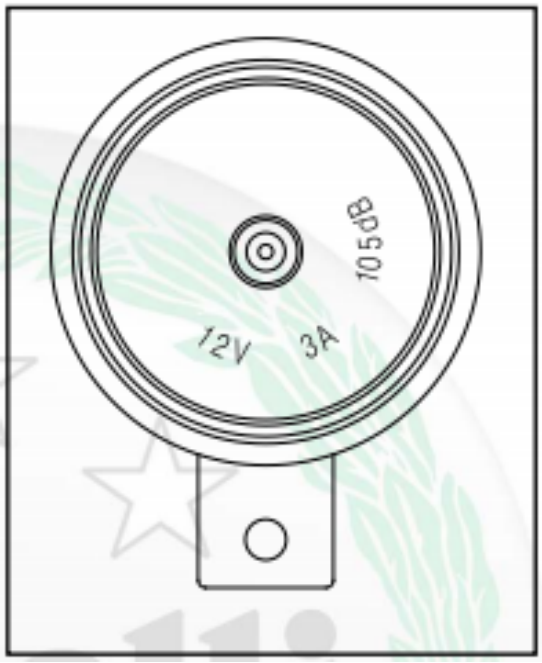
Horn Disassembly

●Remove the horn leads.

Horn Inspection

● Connect a battery (12V) to the horn, if the horn sounds well, it means the horn is OK, otherwise, adjust or replace it..

Resistance 1.4Ω



Fan

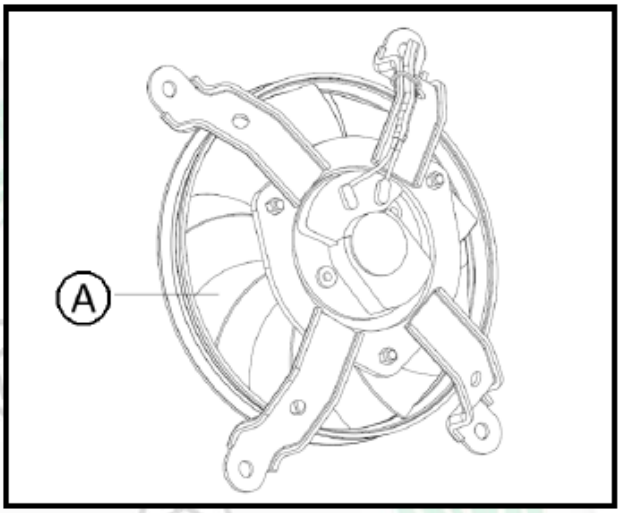
Fan Disassembly

●Disassemble the radiator fan (see the “Disassembling Radiator and Radiator Fan” in the “Radiator” chapter)

Fan Inspection

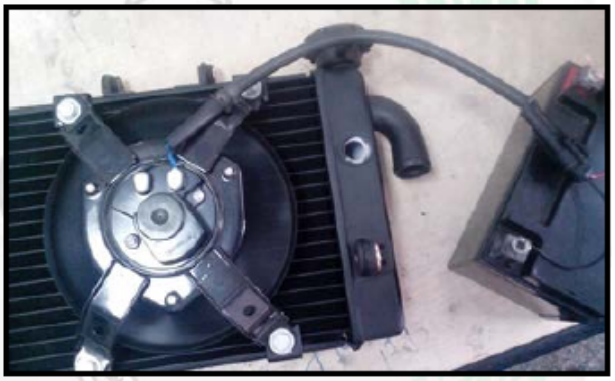
●Check the fan blades [A],

★If the fan blades are damaged, replace the fan component



●Confirm whether the copper terminal in the fan coupler are loose first

★If they are not loose, connect the fan to the positive and negative electrodes of battery directly, as shown in the figure on the right (connect the blue wire to the positive electrode of storage battery and connect the black wire to the negative electrode of storage battery)

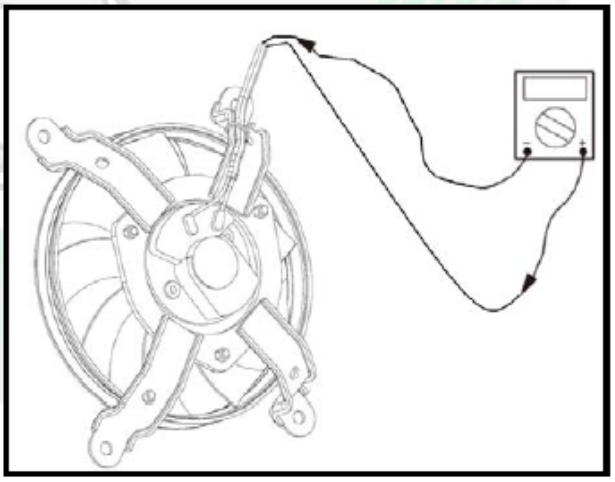


●Check whether the fan rotates and whether the wind blows towards the installing bracket; if the fan does not rotate, replace the fan;

★If the rotation direction is incorrect, exchange the wire plugging position of wire harness

●Use the “Ω” gear of the multimeter to detect the fan motor, as shown in the figure on the right

★If the multimeter display “∞” , the motor is damaged and the fan components shall be replaced



Fan Switch

Fan Switch Disassembly

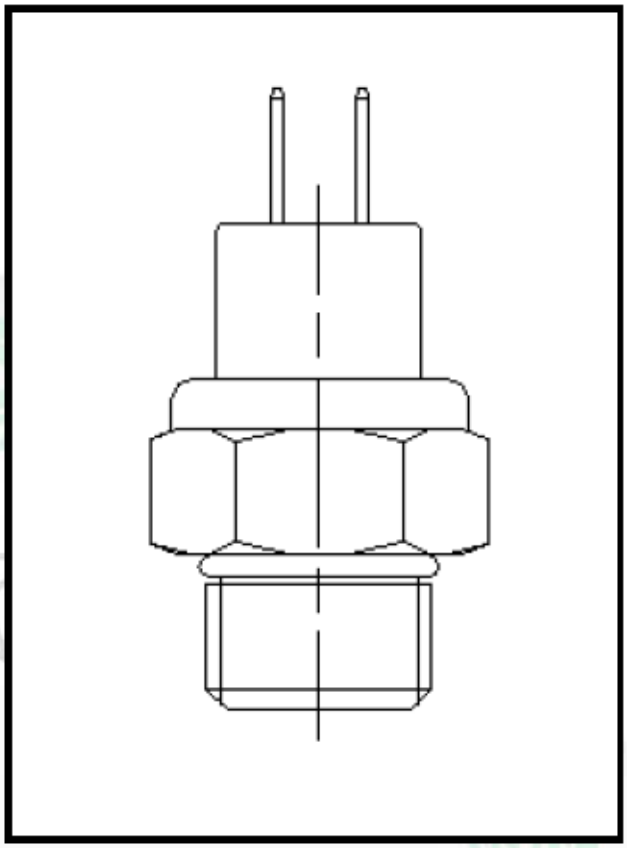
● Disconnect the fan switch coupler

●Disassemble the fan switch

Checking Fan Switch

Breakover temperature 98±4℃,

9℃≥breakover temperature—turn-off temperature≥3℃



Relay and Fuse Box

Relay and Fuse Box Disassembly

●The relay is manufactured on the wire harness directly,

●The position is in the rear tail cover area on the right side of the motorcycle

●Pull the upper cover during disassembly,

●Pull out the No. 2 relay,

● Unscrew the mounting bolt

●Remove the relay

***Note**
There are relay diodes on the relay. The relay diodes on the relay cannot be disassembled

⚠Warning
Do not make the sensor drop on the ground, especially on the hard surface. **The impact shock may damage the sensor**

Relay Circuit Inspection

●Disassemble the relay (see the relay disassembly section)

●Check the conductivity of each terminal by connecting the hand-held multimeter and a 12V battery to the relay (see the internal circuit of relay box in this section)

★If the multimeter reading is out of specification, replace the relay box

Relay Circuit Inspection (Disconnecting Battery)

	Multimeter connection	Multimeter reading (Ω)
Fuel pump relay	3-4	∞
	1-2	Not ∞*
Main relay	7-8	∞
	5-6	Not ∞*
Headlight relay	11-12	∞
	9-10	NOT ∞*

*: Actual readings may be different due to t multi-styled **handheld multimeters used**.

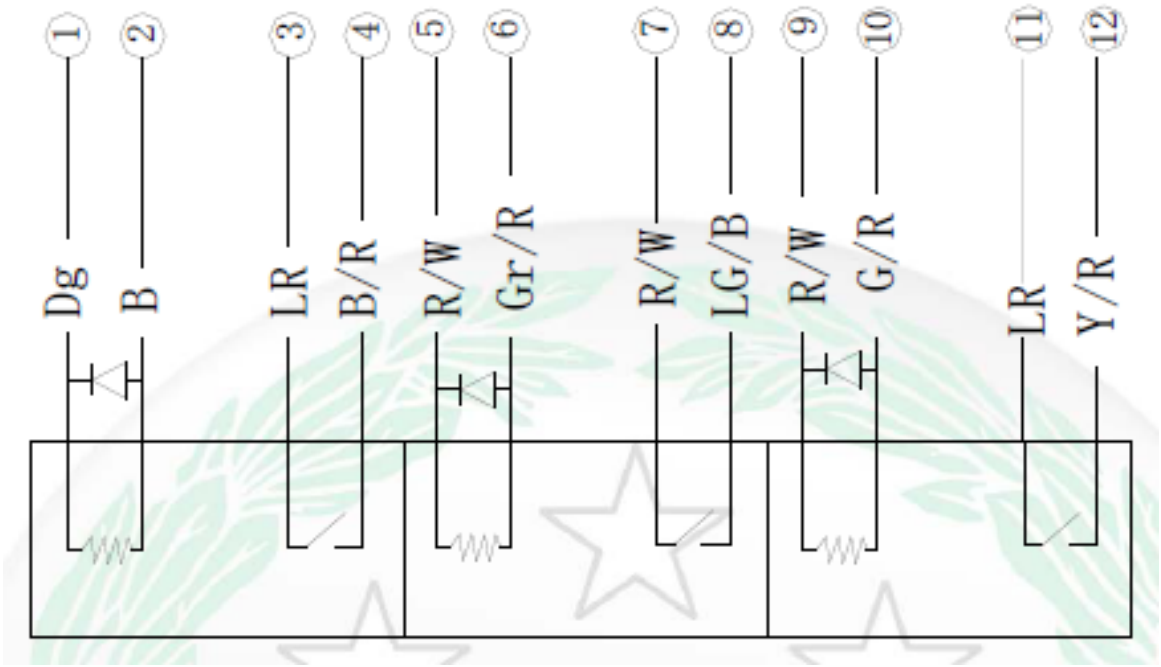
Relay Circuit Inspection (Equipped with Battery)

	Battery connection (+) (-)	Multimeter connection	Multimeter reading (Ω)
Fuel pump relay	1-2	3-4	0
Main relay	5-6	7-8	0
Headlight relay	9-10	11-12	0

(+): to positive wire

(-): to negative wire

Internal Circuit of Relay Box

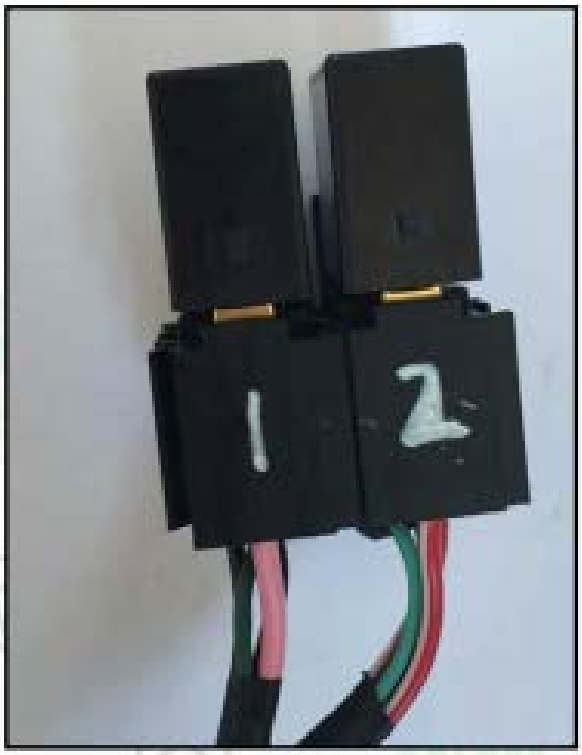


1 Fuel pump relay 2 Main relay 3 Headlight relay

●State 1: relay(Headlight always on)

●State 2: relay

●The headlight is not always on; the relays of this type do not include the No. 3 relay in the state 1 and the inspection method is the same as state 1 relay

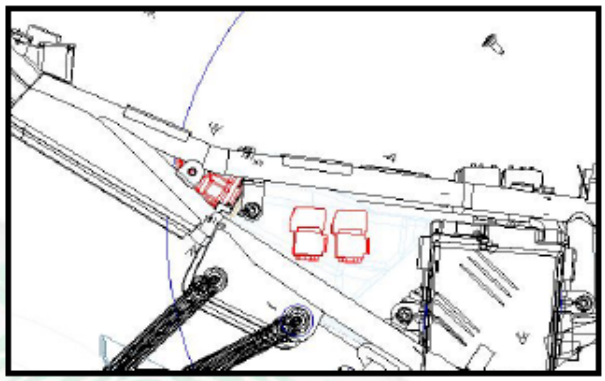


Fuse

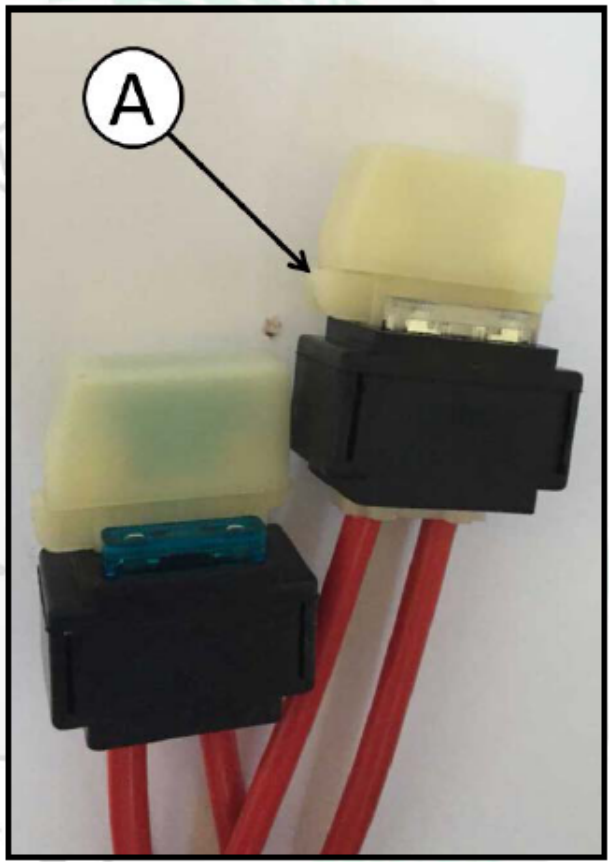
Fuse Disassembly

●Disassemble the seat (see the seat disassembly section in the chapter of frame)

●Disassemble the safety guard on the right side



● Squeeze the latches [A] and open the cover



●Use sharp-nose pliers to pull the fuse up and out of the fuse box

Fuse Installation

★If the fuse break down during operation, check the electrical system to figure out the cause, and then replace the fuse with a new one with suitable ampere

●Install the fuse box at the position specified originally on the cover

Fuse Inspection

●Disassemble the fuse (see the fuse disassembly section)

●Check the fuse parts

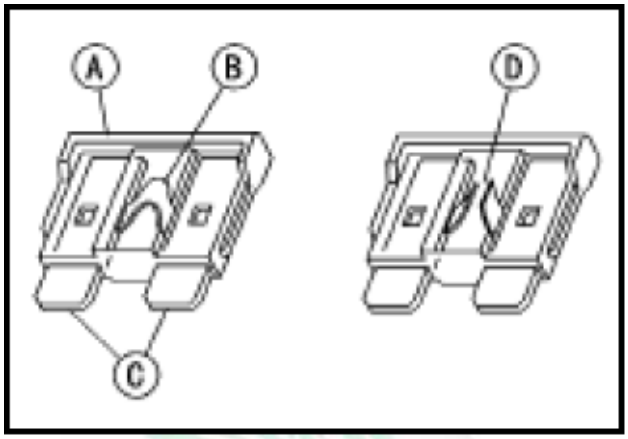
★If the fuse is blown out, replace the fuse. Before replacing the blown fuse, check the amperage of the affected circuit. If the amperage is equal to or greater than the rated current of the fuse, check the circuit and related parts to figure out whether they are short-circuited

Shell [A]

Fuse part [B]

Pins[C]

Blown fuse [D]



Note
○*If start the engine with a battery which severe lose of electricity, thus may generate large current and the large current may damage the fuse*

Warning
When replacing the fuse, make sure that the amperage of new fuse matches the rated current of specified fuse . If the fuse with the amperage which is higher than the rated current is installed, the circuit or part may be damaged.

CHAPTER VIII APPENDIX

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Routing of Cable, Wire and Hose

Main Harness Routing:

. Make the main harness across the frame from right side of steering tube.

Hook the harness with the clamp

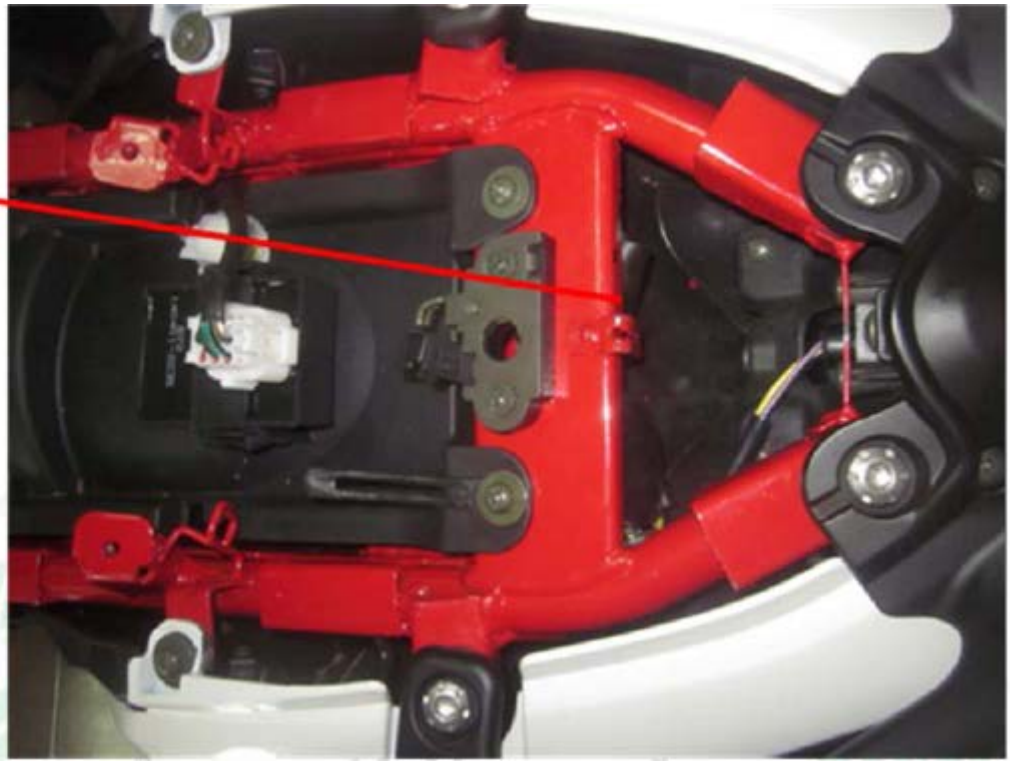
Hook the harness with the clamp and make the main harness pass through the upper side of frame

Run the main harness through the upper side of frame and hook it with the clamp

Run the main harness through the outer side of the air filter installing bracket

Run the main harness through the lower side of the frame bracket as illustrate

Hook the rubber sheath of the main harness end coupler



Throttle Cable Routing

Run the throttle cable through the hole of the upper bridge and connect it with the right handlebar switch

Run the throttle cable through the frame as shown, do not interfere with the clutch cable

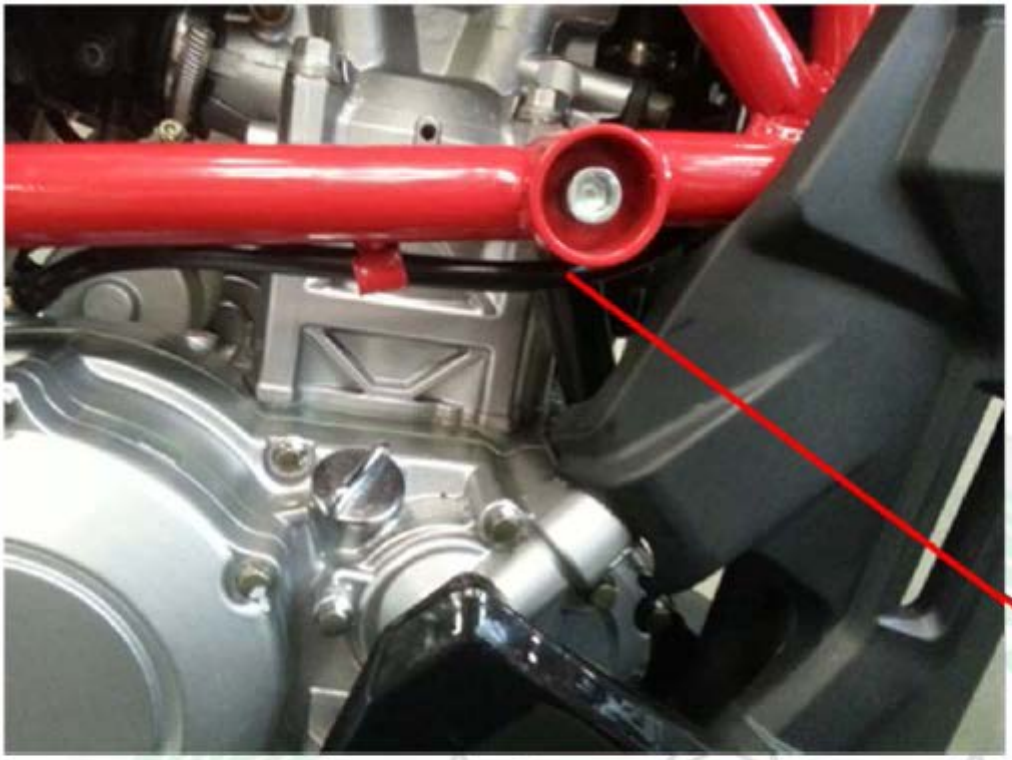
Run the throttle cable through the lower side of frame , as shown

Hook the throttle cable with the clamp. Do not interfere with main harness and clutch cable.

Clutch Cable Routing:

Run the clutch cable through the gap between the meter and upper bridge

Run the clutch cable through the frame as shown. Do not interfere with the throttle cable.



Run the clutch cable as shown and hook it with the clamp

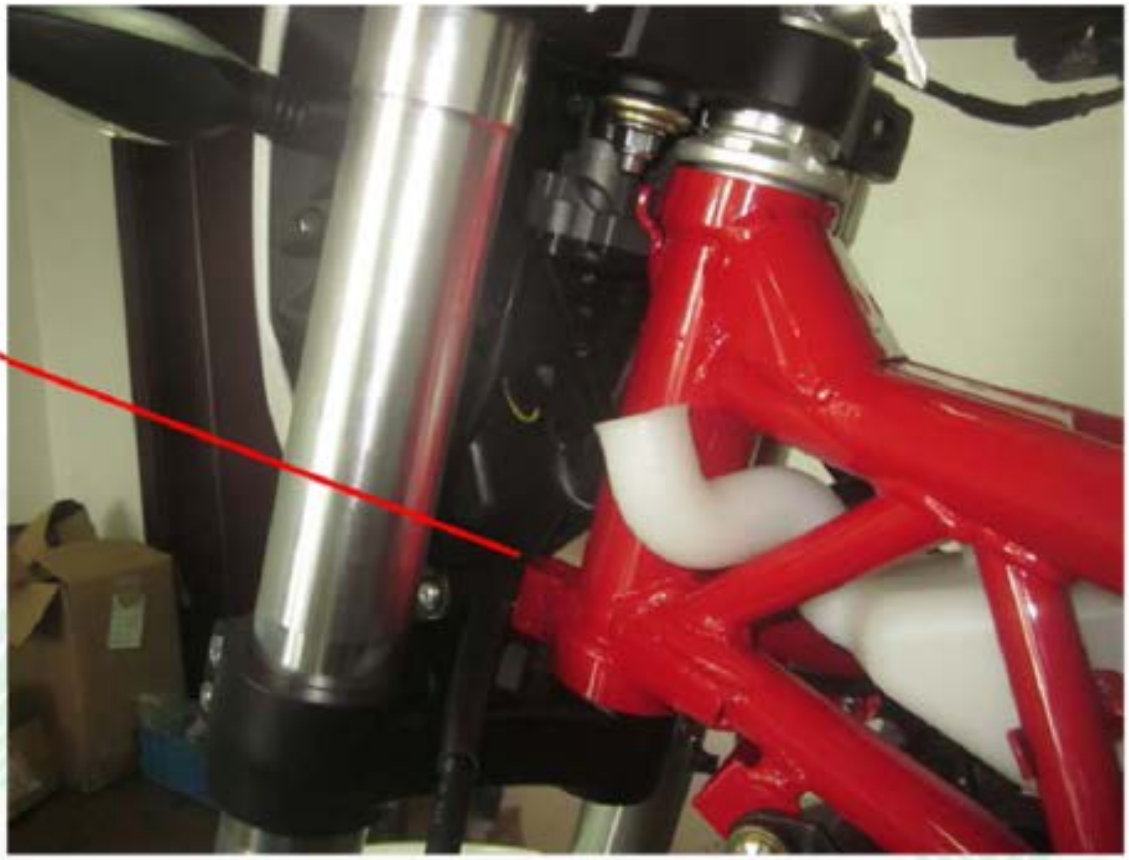
Make clutch line go through the inside of frame, and pay attention to Run the clutch cable through the frame. Do not interfere with throttle cable.

Other Matters:

Clamp the throttle cable, front brake hose and right handlebar switch lead together with a rubber clamp

Clamp the clutch cable and left handlebar switch lead together with a rubber clamp

Run the brake hose through left side of steering tube



Run the front brake hose through the rear side of the lower bridge.

Routing of the radiator inlet hose as shown

Clamp the fan switch lead and engine temperature senser lead with the frame with a cable tie as shown.

Clamp the engine temperature senser with the front frame bracket with a cable tie as shown.

Hook the alternator lead with the clamp.

Clamp the sidestand switch lead with a cable clip

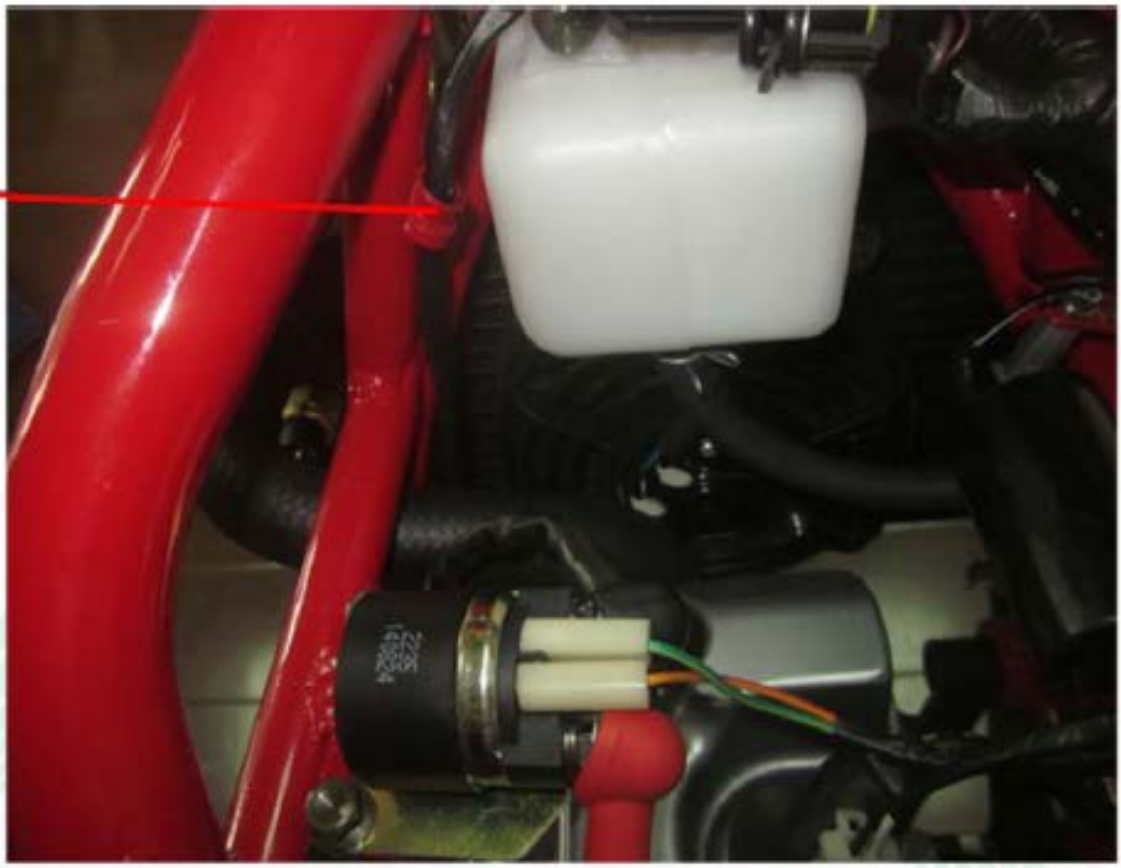
Clamp the sidestand switch lead with a cable tie

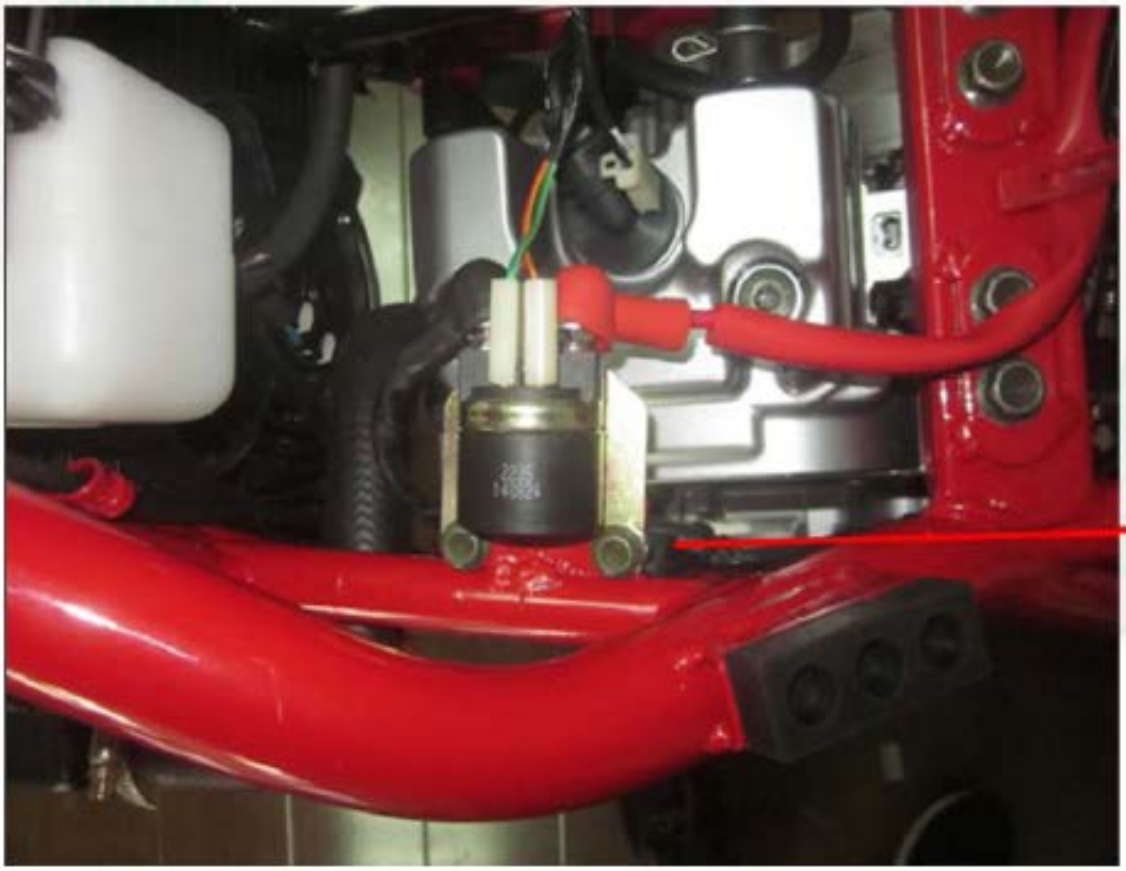
Routing of the sidestand switch lead as shown

Gear position switch lead as shown

Clamp the branch of the main harness, engine power output wire and gear position switch lead together with a cable tie

Hook the branch of the main harness as shown





Clamp the start motor lead with a cable clip as shown

Run the start motor lead through the frame as shown

Clamp the start motor lead and the branch of the main harness with a cable tie

Route the main harness, throttle cable and clutch cable as shown

Route the main harness, throttle cable and clutch cable as shown

Hook the main harness, throttle cable and clutch cable with the clamp.

Hook the branch of the main harness and the main relay positive lead with the clamp.

Hook the main harness, relay positive lead and Oxygen sensor cable with the clamp.

Hook the branch of the main harness and sidestand switch lead with the clamp.

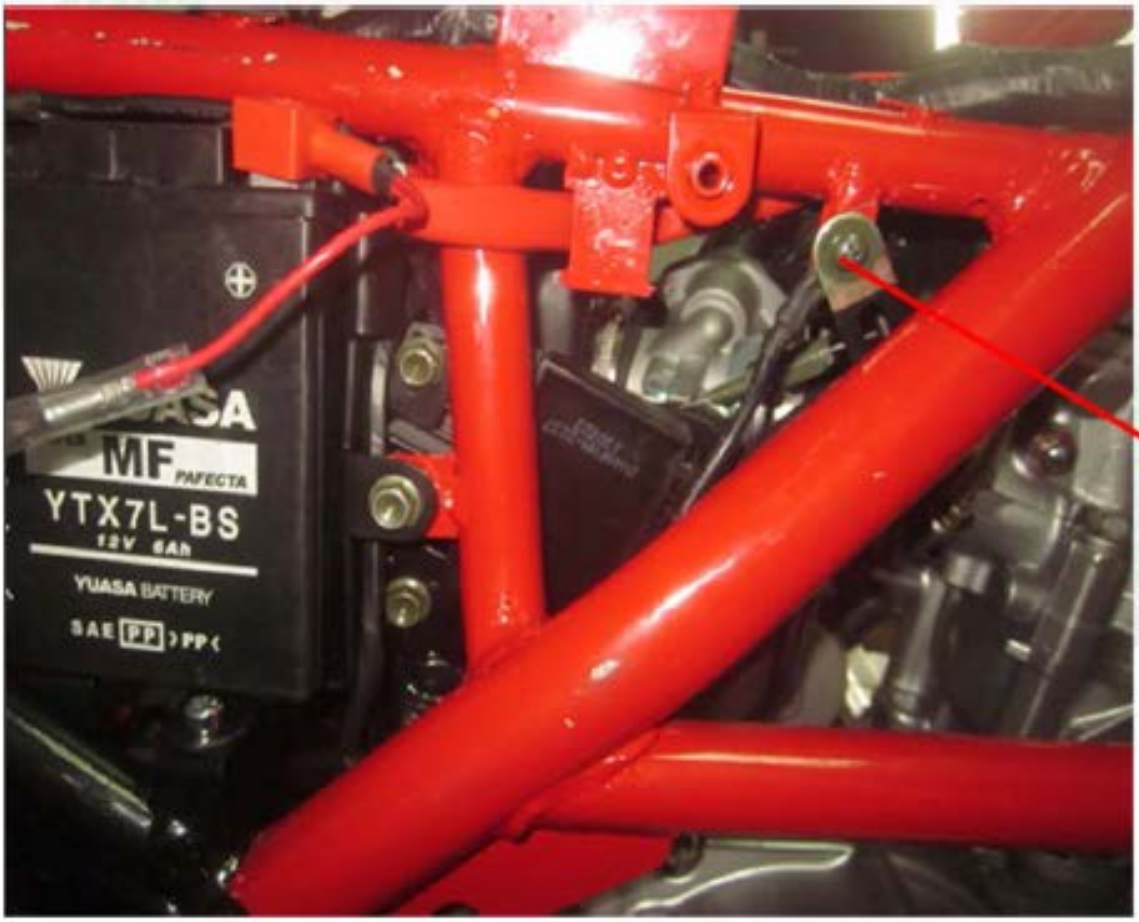
Hook the main harness as shown

ECU installation As shown

Route the igniter lead as shown,

Route the coolant reservoir hose as shown

Clamp the clutch cable and speed sensor with a clamp



The position of motorcycle bond strap as shown

Fuse location as shown

Clamp the rear brake hose and speed sensor cable together with clamp.

Run the rear brake hose and the speed sensor cable through the inner side of the rear swing arm and cable guide as shown

Route the fuel hose as shown

The installation direction of fuel level sensor as shown

Canister c –to- canister solenoid valve hose	5×9×150
Canister –to –roll over valve hose	4.5×8.5×300
Canister solenoid valve –to-engine intake pipe	5×9×100
MAP hose	4.5×8.5×100
Fuel tank –to- rollover valve hose	4.5×8.5×220
Coolant reservoir hose	7×11×240

Troubleshooting Guide

Remarks

○For most of EFI faults, refer to the chapter "EFI".

○This table is not exhaustive and it is unable to list the possible causes of each issue and can only be used as a basic guide to help solve some common problems.

The engine cannot start or is difficult to start:

Starter motor does not run:

The main switch or the engine stop switch is not turned on;
Start button or gear switch fault;
Starter motor fault;
Battery voltage is low;
Starter relay contact is not good or cannot work properly;
Start button contact is not good;
Short circuit or open circuit of starting system;
Main switch fault;
Engine stop switch fault;
30 A main fuse or main switch fuse blows out

Starter motor is running, but the engine does not run:

Motorcycle rollover sensor (EFI) is actuated;
Alarming system fault;
Overrun clutch fault;
Starting idler fault

Engine does not run:

Valve is seized;
Valve stem is seized;
Cylinder and piston is seized;
Crankshaft is seized;
Small end of connecting rod is seized;
Big end of connecting rod is seized;
Transmission gear or bearing is seized;
Camshaft is seized;
Starting idler is seized;
Balance shaft bearings is seized

No fuel flow:

There is no fuel in the tank;
Fuel pump fault;
Breathe hole of fuel tank is blocked;
Fuel filter is blocked;
Fuel hose is blocked

No spark; spark is weak:

Motorcycle rollover sensor (EFI) falls off;
The main switch not switch to "On";
The engine stop switch not switch to "Off";
Not grasp the clutch lever or gear is not at neutral position;
Battery voltage is low;
Anti-theft control Alarming system fault;
Spark plug is dirty, damaged or electrode gap is abnormal;
Spark plug is unsuitable
Short circuit or poor contact of ignition coil ;
High-voltage package Ignition coil fault;
Engine control unit (ECU) fault;
Camshaft position sensor fault;
Gear switch, start button or sidestand switch fault;
Crankshaft sensor fault;
Short circuit of main switch or engine stop switch;
Short circuit or open circuit of starting system;
Main fuse or main switch fuse blows out

Abnorml fuel / air mixture:

Bypass screw and / or idling adjustment screw is abnormal;
Airway is blocked;
Air filter is blocked, sealing is poor or missing;
Oil filling port cover, crankcase breathe hose or air filter drain hose leaks:

Cylinder pressure is too low:

Spark plug is loosened;
Cylinder head is not tightened;
Cylinder and piston is worn;
Piston rings are damaged (worn, weak, damaged or stuck);
The gap between the piston ring and the piston ring groove is too large;
Cylinder head gasket is damaged;
Cylinder head is deformed;
Valve spring is damage or the elasticity is poor;
There is no valve clearance;
Valve is not installed properly (valve is bent or worn or there is carbon deposition at valve seat)

Abnormal running during low-speed driving:

Spark is weak:

Battery voltage is low;
Alarming system fault;
Ignition coil fault;
Short circuit or poor contact of ignition coil;
Spark plug is dirty, damaged or clearance is abnormal;
Spark plug is unsuitable;
Engine control unit (ECU) fault;
Camshaft position sensor fault;
Crankshaft sensor fault

Abnormal fuel / air mixture:

Bypass screw is poor adjusted;
Airway is blocked;
Exhaust pipe and exhaust vent is blocked;
Idle air channel is blocked;
Air filter is blocked, leaky or not installed;
Fuel tank vent is blocked;
Fuel pump fault;
Throttle body assembly fixer is loosened;
Vent pipe fixer is loosened

Cylinder pressure is too low:

Spark plug is loosened;
Cylinder head is not tightened;
There is no valve clearance;
Cylinder and piston is worn;
Piston rings are damaged (worn, weak, damaged or stuck);
The gap between the piston ring and the piston ring groove is too large;
Cylinder head gasket is damaged;
Cylinder head is deformed;
Valve spring is damage or the elasticity is poor;
Valve is not installed properly (valve is bent or worn or there

Abnormal running or poor power during high-speed driving:

Ignition is abnormal:

Spark plug is dirty, damaged or abnormal;
Spark plug is unsuitable;
Short circuit or poor contact of ignition coil ;
Ignition coil fault
Engine control unit (ECU) fault

Abnormal fuel / air mixture:

Air filter is blocked, the sealing is poor or there is no air filter;
Breathe hose fixer is loosened;
There is water or foreign matter in the fuel;
Throttle body assembly fixer is loosened;
Insufficient fuel supply to fuel injector;
Fuel tank airway is blocked;
Fuel hoseis blocked;
Fuel pump fault;

Cylinder pressure is too low:

Spark plug is loosened;
Cylinder head is not tightened;
There is no valve clearance;
Cylinder and piston is worn;
Piston rings are damaged (worn, weak, damaged or stuck);
The gap between the piston ring and the piston ring groove is too large;
Cylinder head gasket is damaged;
Cylinder head is deformed;
Valve spring is damage or the elasticity is poor;
Valve is not installed properly (valve is bent or worn or there is carbon deposition at valve seat)

is carbon deposition at valve seat)
Camshaft and cam wear
It continues to run after cutting off main switch:
Main switch fault;
Engine stop switch fault;
Fuel injector fault;
The battery negative (-) or engine control unit (ECU) grounding wire is loosened;
There is carbon deposition at the valve seat;
The engine is overheated

Others:

Engine control unit (ECU) fault;
Throttle body negative pressure imbalance;
Oil viscosity is too high;
Drive system fault;
Brake dragging;
Clutch is slipping
Engine is overheated
Breathe valve fault;
Secondary air inlet valve fault

"Click" sound from engine:

There is carbon deposition in combustion chamber;
Fuel quality is poor or fuel type is unsuitable;
Spark plug is unsuitable;
Engine control unit (ECU) fault

Others:

Throttle valve cannot be fully opened;
Brake dragging;
Clutch is slipping;
Engine is overheated;
Oil level is too high;
Oil viscosity is too high;
Drive system fault;
Camshaft and cam is worn;
Breathe valve fault;
Secondary air inlet valve fault;
Catalytic agent melting caused due to the overheating of muffler

Temperature is too high:

Ignition is abnormal:

Spark plug is dirty, damaged or abnormal;
Spark plug is unsuitable;
Engine control unit (ECU) fault

Muffler is overheated:

For Benelli emission control systems, if the cylinder is not ignited or the running is abnormal, do not start the engine (go the nearest service center for maintenance);
For the Benelli emission control system, if the battery power runs out, do not start the motorcycle (connect and hang another fully charged battery , and then electrically start the engine);
For Benelli emission control systems, if ignition is abnormal because of very dirty spark plug or poor contact of ignition coil, please do not start the engine;
For the Benelli emission control system, when switch the main switch to "Off", do not ride a motorcycle and slide using inertia (switch the main switch to "On", and start engine);
Engine control unit (ECU) fault

Abnormal fuel / air mixture:

Throttle body assembly fixer is loosened;
Breathe hosefixer is loosened;
Sealing of air filter is poor or there is no air filter;
Air filter is blocked

Cylinder pressure is too high

There is carbon deposition in the combustion chamber

Insufficient engine output power:

Clutch is slipping
Oil level is too high;
Oil viscosity is too high;
Drive system fault;
Brake dragging

Improperly adding lubrication oil:

Overcooling:

Instrument is abnormal:

Thermostat is damaged;
Engine temperature sensor is damaged

Cooling system components are abnormal:

Thermostat fault;

Clutch is abnormal:

Clutch is slipping:

Friction plate wear or deformation;
Clutch plate wear or deformation;
Clutch spring damage or poor elasticity;
Clutch bushing is worn and uneven;

Clutch cannot be properly separated:

Clutch plate is deformed or too rough;
Clutch spring compression is uneven;
Oil deterioration;
Oil viscosity is too high;
Oil level is too high;
Clutch bushing and drive shaft is seized;
Clutch bushing nut is loosened;
Clutch bushing spline is damaged;
Clutch friction plate is installed incorrectly
Clutch oil deterioration;
There is air in clutch pipe;

Oil level is too low;
Oil is poor or unsuitable

Instrument is abnormal:

Thermostat is broken;
Water Engine temperature sensor is broken

Coolant is abnormal:

Coolant level too low;
Coolant deterioration;
Coolant mixing ratio is incorrect

Cooling system components are abnormal:

The radiator fins is broken;
Radiator is blocked;
Thermostat fault;
Radiator cap fault;
Radiator fan relay fault;
Fan motor is damaged;
Fan blade is damaged;
Coolant pump does not run;
Coolant pump impeller is damaged

Problem with shifting:

Can't engage the gear; shift pedal cannot be reset:

Clutch cannot be separated;
Shifting fork is bent or stuck;
Shifting gear stuck.
Shift positioning roller is blocked
Shift returning spring has poor flexibility or is damaged;
Shift shaft return spring pin is loosened;
The shift shaft return spring is damaged
The shift shaft is damaged
The shifting pawl is damaged

Jumps out of gear

Shift fork is worn or bent;
Shifting gear groove is worn;
Gear dogs or gear dog holes is worn;
Shift drum groove is worn;
Gear positioning roller spring has poor flexibility or is damaged;
Shift fork guide pin is worn;
Drive shaft, output shaft and / or gear spline is worn

Over gear Shifting:

Gear positioning roller spring has poor flexibility or is damaged;
Shift shaft return spring is broken ;

Engine makes abnormal noise:

"Click" fault sound:

Engine control unit (ECU) fault
Carbon deposition in combustion chamber;
Fuel quality is poor or fuel type is unsuitable;
Spark plug is unsuitable;
Engine is overheated

Knocking noise at piston:

The clearance between cylinder and piston is too large;
Cylinder and piston is worn;
Connecting rod is bent;
Piston pin or piston pin hole is worn;

Valve makes noise:

The valve clearance is incorrect;
Valve spring is damaged or the elasticity is poor;
Camshaft stop ring is worn;
Valve stem wear
Other noises:
The clearance at the small end of connecting rod is too large;
The clearance at the big end of connecting rod is too large;
The gap between the piston ring and the piston ring groove is too large
Piston ring is worn, damaged or stuck;
Piston ring groove is worn;
Piston is seized or damaged;
Cylinder head gasket leaks;
The exhaust pipe of cylinder head connecting part leaks;
Crankshaft oscillation is too large;
Engine is loosened;
Crankshaft bearing is worn;
Main gear is worn or has a gap;
Timing chain tensioner fault;
Timing chain, sprocket or guide plate is worn;
The breathe valve is broken;
Secondary air inlet valve is broken;
Alternator rotor is loosened;
Overheating of muffler causes melting of catalytic converter (Benelli emission control system)

The drive system makes abnormal noise:

Clutch noise:

The clearance between clutch housing and friction plate is too large;

Clutch housing is worn;

External friction plate is installed incorrectly

Transmission device makes noise:

Bearing is worn;

Transmission gear is worn or has a gap;

The metal fragments is stuck in gear teeth;

Oil shortage;

Drive system makes noise:

The drive chain is not adjusted properly;

Drive chain is worn;

Rear sprocket and / or engine sprocket is worn;

Lack of Chain lubricating Oil;

Rear wheel is not aligned well

The frame noise:

Front fork noise:

Lack of lubricating oil or too thin oil film;

Spring has poor elasticity or is damaged

Rear shock absorber noise:

Shock absorber is broken;

Brake disc noise:

Friction plates are not installed correctly;

Friction plate working surface is worn out

Brake disc deformation;

Caliper fault;

Other noises:

The brackets, nuts, bolts and other parts are not properly installed or locked.

Too much exhaust smoke:

White exhaust smoke:

Piston oil ring is worn;

Cylinder is worn;

Valve seal is damaged;

Valve guide is worn;

Oil level is too high

Black exhaust smoke:

Air filter is blocked

Brown exhaust smoke:

Vent pipe clamp is loosened;

Air filter has poor sealing or not assembled

Poor performance and / or stability:

The handlebar is difficult to turn:

Routing of cable is incorrect;
Routing of hose is incorrect;
Routing of wire is incorrect;
Steering stem head nut is too tight;
Steering stem head bearing is broken;
Lubricating oil in steering stem head bearing is insufficient;
Steering stem head is bent;
Tire pressure is too low

The handlebar shakes or vibrates severely:

Tire is worn;
Swing arm main shaft bearing is worn;
Rim deformation or imbalance;
Wheel bearing is worn;
Handlebar holder bolt is loosened;
Steering stem head nut is loosened;
The run-out of front shaft and rear shaft is too large;
Engine mounting bolt is loosened;

Handlebar is swinging to one side:

Frame is bent;
The wheels are misaligned;
The arm is bent or twisted;
The oscillation of main shaft of swing arm is too large;
Steering stem head adjustment error;
Front shock absorber is bent;
Left and right front shock absorber oil level is unsymmetrical

Shock absorber effect is not perfect:

(too hard)
Excessive front shock absorber oil;
The viscosity of front shock absorber oil is too high;
Rear shock absorber is too hard
Tire pressure is too high;
Front shock absorber is bent;
(Too soft)
Tire pressure is too low;
Front shock absorber oil is insufficient and / or leaks;
The viscosity of front shock absorber oil is too low;
Rear shock absorber is too soft
The elasticity of front shock absorber and rear shock absorber springs are too poor;
Rear shock absorber leaks

Brake cannot work

There is air in the brake hose;
Friction plate or brake disc is worn;
Brake fluid leaks;
Brake disc is deformed;
Brake pads is contaminated;
Brake fluid deterioration;
The main cup and secondary cup in the brake master cylinder are damaged;
The inner wall of brake master cylinder is scratched

Battery fault:

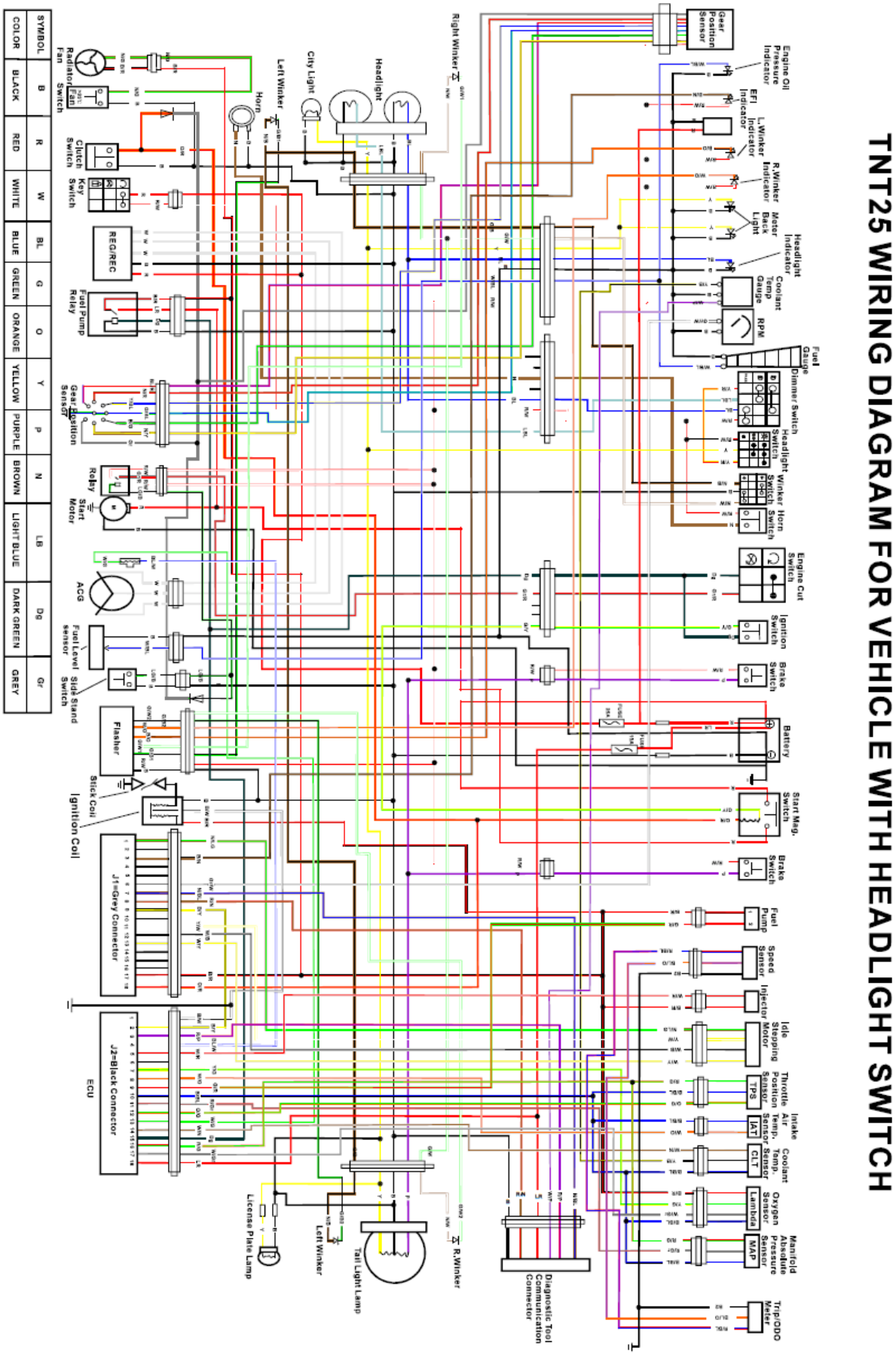
Battery power runs out:

Not enough power;
There is problem with battery (voltage too low);
Poor battery cable contact;
Load is too large (such as: bulb power is too large);
Main switch fault;
Alternator fault;
There is a problem with the circuit;
Regulator / rectifier fault

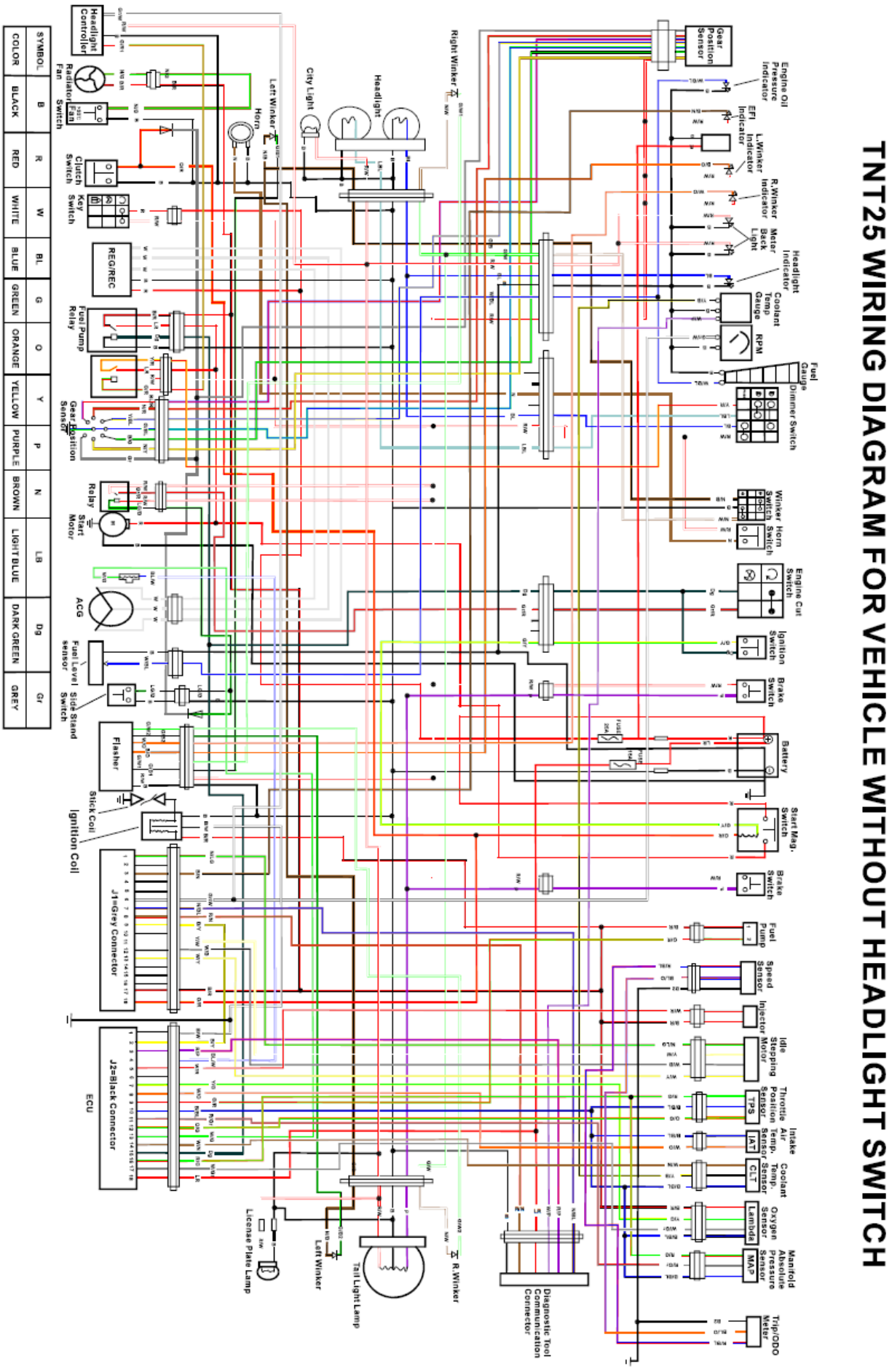
Battery overcharging:

Alternator fault;
Regulator / rectifier fault;
There is problem with battery

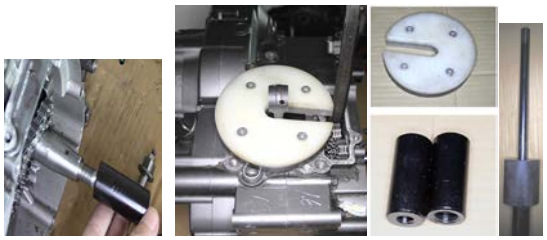
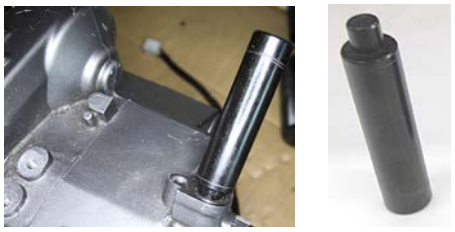
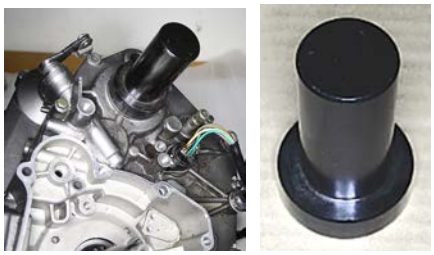
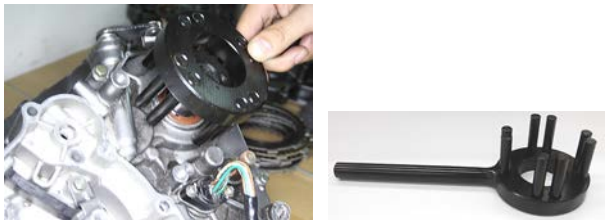
Circuit Diagram



TNT25 WIRING DIAGRAM FOR VEHICLE WITHOUT HEADLIGHT SWITCH



Special Tool list Summary

gear shift oil seal installer & gear shift oil seal guide rod (2PCs in 1 set)	ACG crankshaft puller+ crankshaft installation guide plate (2PCs as 1 set)
Complete Code:BN-20000-515-0	Complete Code:BN-17901-515-0
	
ACG flywheel puller+flywheel/ one-way clutch stopper (2PCs as 1 set)	NEEDLE BEARING 12×16×10 (clutch lever needle bearing tool)
Complete Code:BN-29902-515-0	Complete Code:BN-B1212-515-0
	
output shaft/ bush installer	Clutch hub fixing tool
Complete Code:BN-15023-515-0	Complete Code:BN-20920-515-0
	
front sprocket fixing tool	Valve spring compress tool
Complete Code:BN-21403-515-0	Complete Code: BN-12933-515-0
	

300cc steering special nut 4T wrench	300cc steering special nut 7T wrench
Complete Code:BN43008-622-0	Complete Code:BN43009-622
Front steering bracket support	RR swingarm support
Complete Code:BN-43011-622-0	Complete Code:BN53021-622-0
Footrest bracket C ring tool	Footrest bracket bush installer
Complete Code：BN-58222-515-0	Complete Code：BN-58244-622-0